

Structure-Activity Relationships of the ATP cofactor in Ligase-Catalysed Oligonucleotide Polymerisation

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Supporting methods

General Information

Unless otherwise noted, water was purified with Milli-Q purification system. DNA oligonucleotides without amine modification were purchased from Integrated DNA Technologies. DNA oligonucleotides with amine modification were synthesized on a Bioautomation Mermade 12 synthesizer. All materials and reagents used for oligonucleotide synthesis were purchased from Glen Research. All oligonucleotides were synthesized and deprotected according to the manufacturer's protocols. Oligonucleotides were purified by reverse-phase high-pressure liquid chromatography (HPLC, Agilent 1260) using a C18 stationary phase (Eclipse-XDB C18, 5 μ m, 9.4 x 200 mm) and an acetonitrile/100 mM triethylammonium acetate gradient. Oligonucleotide concentrations were quantitated by UV spectroscopy using a Nanodrop ND2000 spectrophotometer. Nucleoside triphosphates were purchased from TriLink.

DNA Sequences

The sequences below are written from 5' $\rightarrow$ 3'. <Aam> = Amino-modifier C6 dA, <N>=A/T/C/G

Templates

TH(NNNNT)8P /5Phos/ TGC GAC GGC AGG TTC CCC TGC CGT CGC ANN NNT NNN NTN
NNN TNN NNT NNN NTN NNN TNN NNT NNN NTC ACG TGG AGC TCG GAT CC

TP(NNNNT)8PT /5Phos/GA TTC GCC TGC CGT CGC ANN NNT NNN NTN NNN TNN NNT
NNN NTN NNN TNN NNT NNN NTC ACG TGG AGC TCG GAT CCT

Primers

PR1 GGA TCC GAG CTC CAC GTG

PR5 /5Phos/GG ATC CGA GCT CCA CGT G

PR6 /5Phos/TG CGA CGG CAG GCG AAT CT

PRIMER B AAT GAT ACG GCG ACC ACC GAG

iTruS_i7_D709 CAA GCA GAA GAC GGC ATA CGA GAT CGG CTA TGG TGA CTG GAG TTC AG

iTruS_i7_D710 CAA GCA GAA GAC GGC ATA CGA GAT TCC GCG AAG TGA CTG GAG TTC AG

iTruS_i7_D711 CAA GCA GAA GAC GGC ATA CGA GAT TCT CGC GCG TGA CTG GAG TTC AG

iTruS_i7_D712 CAA GCA GAA GAC GGC ATA CGA GAT AGC GAT AGG TGA CTG GAG TTC AG

Adapters

Adapter A AAT GAT ACG GCG ACC ACC GAG ATC TAC ACT CTT TCC CTA CAC GAC GCT
CTT CCG ATC T

Adapter B /5phos/AC TGN NNN NNN NNN NNN NAG ATC GGA AGA GCA CAC GTC TGA
ACT CCA GTC AC

Pentanucleotides

NH₂-ANNNN/5Phos/<Ama>NNNN

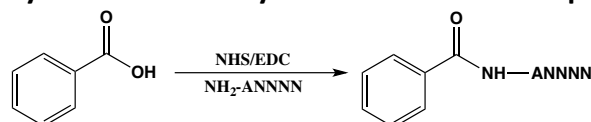
Synthesis of pentanucleotides

Synthesis of amino-modified pentanucleotides

Pentanucleotides were synthesized on a Mermaid 12 DNA synthesizer using a DMT-ON protocol on a 1 μ mol scale (1000 Å CPG column). Amine-modifier C6 dA (Glen Research 10-1089), dA+dC+dG+dT-CE

Phosphoramidite (Glen Research 10-1000, 10-1010, 10-1020, 10-1030), Chemical Phosphorylation Reagent II (10-1901) were incorporated as specified by the manufacturer. Following synthesis, the oligonucleotide was cleaved from the resin by incubation at 25°C in 400 µL of a 1:1 mixture of ammonium hydroxide and methylamine for 25 minutes. The cleaved resin was filtered away by filtration, followed by incubation at 60°C for 30 minutes to remove the protecting groups on phosphoramidites. The oligonucleotide was concentrated under reduced pressure using a speedvac. The residue was then taken up into 100µL of H₂O, and purified using reverse-phase HPLC purification using a [10% acetonitrile in 0.1M TEAA, pH7] to [80% acetonitrile in 0.1M TEAA, pH7] solvent gradient with a column temperature of 45°C. The purified oligonucleotide was then incubated at room temperature in 1mL of 40% aqueous acetic acid for 1 h to cleave the DMT group, and then frozen and lyophilized. The oligonucleotide was incubated in 500 µL 30% ammonium hydroxide at room temperature for 15 minutes to cleave the CPRII linker. Following deprotection, the oligonucleotide was concentrated under reduced pressure using a speedvac. The dried product was dissolved into 100µL H₂O and subjected to reverse-phase HPLC purification using a [10% acetonitrile in 0.1M TEAA, pH7] to [80% acetonitrile in 0.1M TEAA, pH7] solvent gradient with a column temperature of 45°C. The purified oligonucleotide was dissolved in water.

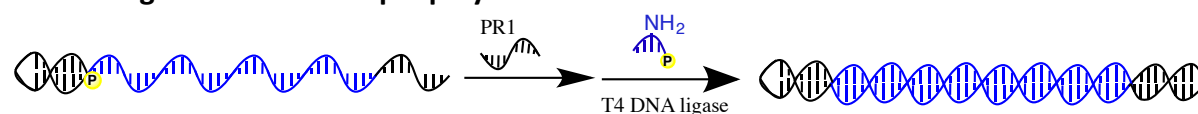
Synthesis of benzoylated amino-modified pentanucleotides



A mixture of 25µL benzoic acid (100mM in DMSO), 25 µL N-Hydroxysuccinimide (NHS, 100 mM in 1:1 mixture of DMSO and H₂O), 5 µL 1-Ethyl-3-(3-dimethylaminopropyl)carbodiimide (EDC, 100 mM in DMSO) and 7.5 µL DMSO was incubated at room temperature for 30 minutes. Followed by addition 7.5 µL of amino-modified pentanucleotides (10 nmol in H₂O) and 30 µL Na₂CO₃ buffer (500 mM in H₂O, pH 9). The mixture was incubated at room temperature overnight with vortex. The reaction was then quenched by addition of 15 µL Tris buffer (500 mM in H₂O) at room temperature for one hour and functionalized pentanucleotide was then purified with HPLC purification using a [10% acetonitrile in 0.1M TEAA, pH 7] to [80% acetonitrile in 0.1 M TEAA, pH 7] solvent gradient with a column temperature of 45°C. The purified modified pentanucleotides were dissolved in water and characterized with mass spectrometry.

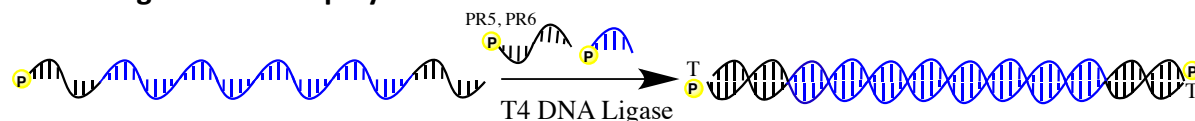
T4-DNA Ligase-mediate adapter ligation protocols

T4-DNA Ligase-mediate hairpin polymerization



In a PCR tube was added 1.5µL DNA template TH(NNNNT)8P (10µM in water), 2.25µL PR1 (10µM in water), 5µL reaction buffer 4X (1X buffer: 66mM Tris-HCl, 10mM MgCl₂, 1mM DTT, 6% PEG6000, pH7.6@25°C), 2µL modified ATP cofactor (0.25mM or 10mM in water) and 6.25µL water. The mix was heated to 90 °C for 2 minutes and then cooled to 25 °C at the rate of 0.1 °C/s. In this PCR tube was then added 1µL pentanucleotides NH₂-ANNNN(480 µM in water), 1µL BSA (2 mg/mL in water) and 400 U T4 DNA ligase (New England Biolabs, M0202L). The polymerization was performed at 25 °C for 24 hours. The products were then purified with MinElute® PCR Purification Kit.

T4-DNA Ligase-mediate polymerization



In a PCR tube was added 1.5μl DNA template TH(NNNNT)8P (10μM in water), 2.25μl PR5 and PR6 (both 10μM in water), 5μl reaction buffer 4X (1X buffer: 66mM Tris-HCl, 10mM MgCl₂, 1mM DTT, 6% PEG6000, pH7.6@25°C), 2μl modified ATP cofactor (0.25mM or 10mM in water) and 4μl water. The mix was heated to 90 °C for 2 minutes and then cooled to 25 °C at the rate of 0.1 °C/s. In this PCR tube was then added 1μl pentanucleotides NH₂-ANNNN(480μM in water), 1μl BSA (2 mg/mL in water) and 1μl T4 DNA ligase (400U/μL, New England Biolabs, M0202L). The polymerization was performed at 25 °C for 24 hours. The products were then purified with MinElute® PCR Purification Kit for adapter ligation step.

Adapter duplex synthesis



In a PCR tube was added 15μl of 100μM adapterA and 15μl of 100μM adapterB, then the tube was heated to 95°C for 5 minutes, and cooled to room temperature over one hour. Then in this PCR tube was added 4μl NEBuffer2 10× (New England Biolabs, M0212L), 25U Klenow Fragment (3'→5' exo⁻, New England Biolabs, M0212L), 1μl dNTP Mix (Thermo Scientific, 10mM each). The extension was performed at 37°C for 1 hour. The adapter duplex was purified with QIAquick Nucleotide Removal Kit, diluted with 30μl water.

In a PCR tube was added 30μl purified adapter duplex, 5μl NEBuffer2 10× (New England Biolabs, M0212L), 25U Klenow Fragment (3'→5' exo⁻, New England Biolabs, M0212L), 5μl dATP (Thermo Scientific, 10mM), 5μl water. This PCR tube was incubated at 37°C for 1 hour for A-tailing. Then product was purified with QIAquick Nucleotide Removal Kit, diluted with 30μl water.

Adapter ligation



In a PCR tube was added 10pmol polymerization products, 200pmol A-tailing adapter duplex, 10μl NEBNext® Quick Ligation Reaction Buffer 5×, 2.5μl BSA (2mg/mL in H₂O), 2.5μl T4 DNA ligase (400U/μL, New England Biolabs, M0202L), the total volume of reaction was adjusted to 50μl with water. The ligation was performed at 16 °C for 16 hours. The ligated products were then gel purified.

PCR protocols

Each purified adapter ligation product was amplified with a different primer from iTrus_D709 to iTrus_D712.

In a PCR tube was added 30attomole purified adapter ligation product in 10μl water, 2.5μl 10μM Primer B, 2.5μl 10μM corresponding iTrus_D7XX primer, and 25μl Q5® High-Fidelity 2× Master Mix

(New England Biolabs). The tube was then transferred to a preheated thermocycler (98°C). The PCR cycle was 10s of 98°C denature step, 30s of primer annealing step (annealing temperature was 55°C for the first two cycles, and 71°C for the rest of the cycles), and 30s of 72°C extension step. The PCR products were then gel purified.

High-Throughput DNA sequencing Protocol

The concentrations of gel purified samples were determined with Kapa library quantification kit for Illumina libraries (KK4845) on Roche LightCycler 480. Paired-end Illumina sequencing was performed on an Illumina MiSeq system using the kit v2 with 300 cycles (150bp PE sequencing) at the Georgia Genomics Facility, University of Georgia, Athens, GA, USA

Supporting Data

Yield analysis

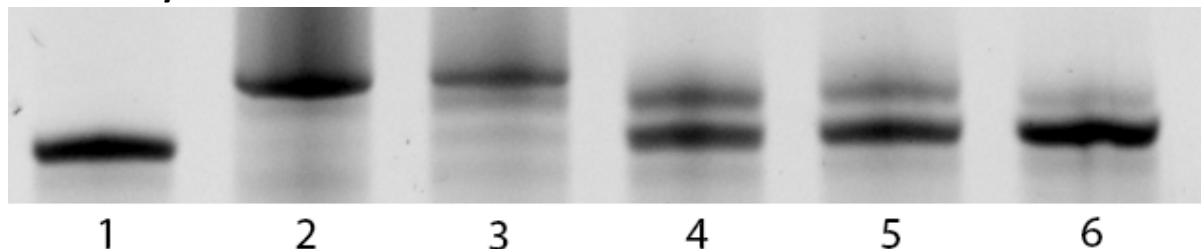


Figure S1. Hairpin polymerization of amino-modified ANNNN using various modified ATP cofactors at 25 μ M. Lane 1, template; Lane 2, ATP; Lane 3, cofactor 9; Lane 4, cofactor 8; Lane 5, cofactor 16; Lane 6, cofactor 12.

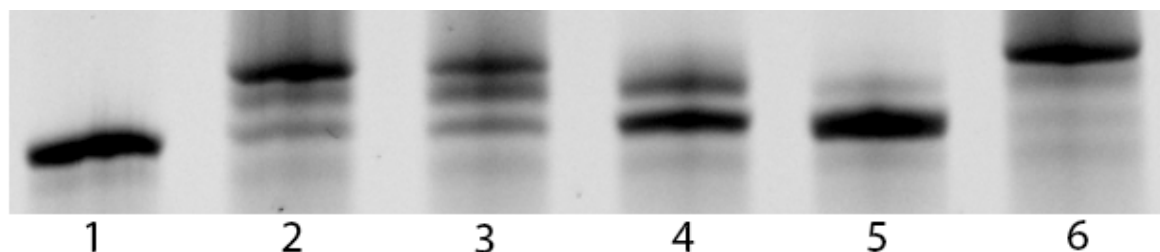


Figure S2. Hairpin polymerization of amino-modified ANNNN using various modified ATP cofactors at 1000 μ M. Lane 1, template; Lane 2, ATP; Lane 3, cofactor 9; Lane 4, cofactor 8; Lane 5, cofactor 16; Lane 6, cofactor 12.

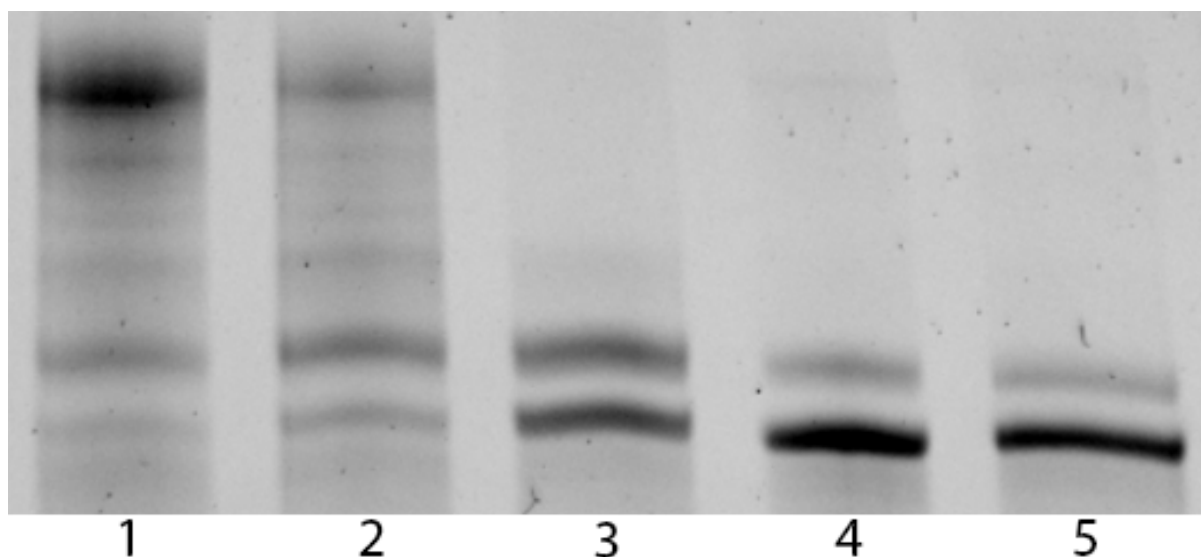


Figure S3. Hairpin polymerization of benzoylated amino-modified ANNNN using various modified ATP cofactors at 25 μ M. Lane 1, ATP; Lane 2, cofactor 9; Lane 3, cofactor 8; Lane 4, cofactor 16; Lane 5, cofactor 12.

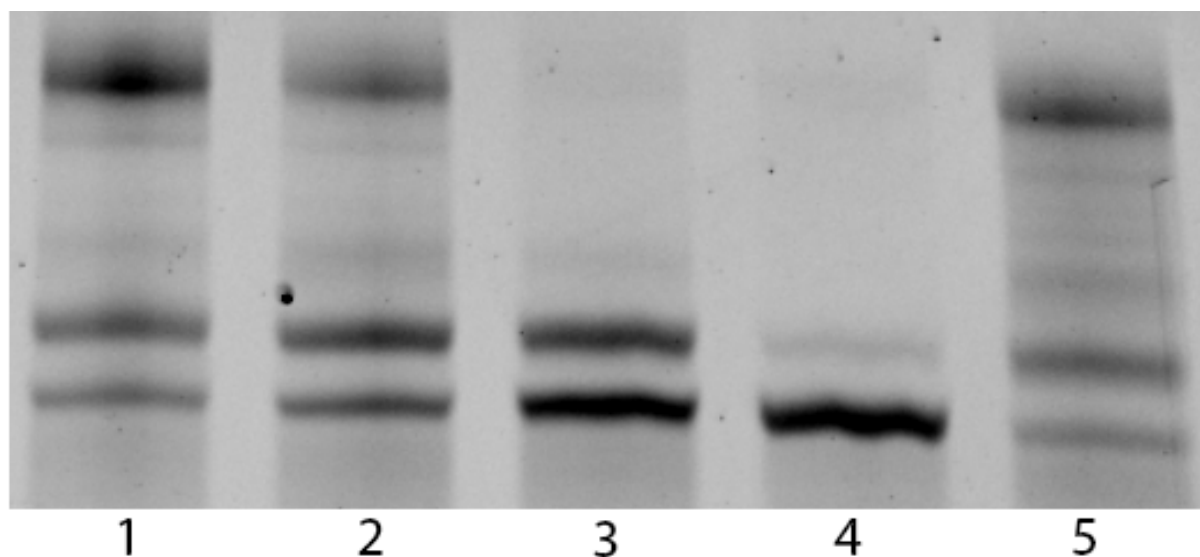


Figure S4. Hairpin polymerization of benzoylated amino-modified ANNNN using various modified ATP cofactors at 1000 μ M. Lane 1, ATP; Lane 2, cofactor 9; Lane 3, cofactor 8; Lane 4, cofactor 16; Lane 5, cofactor 12.

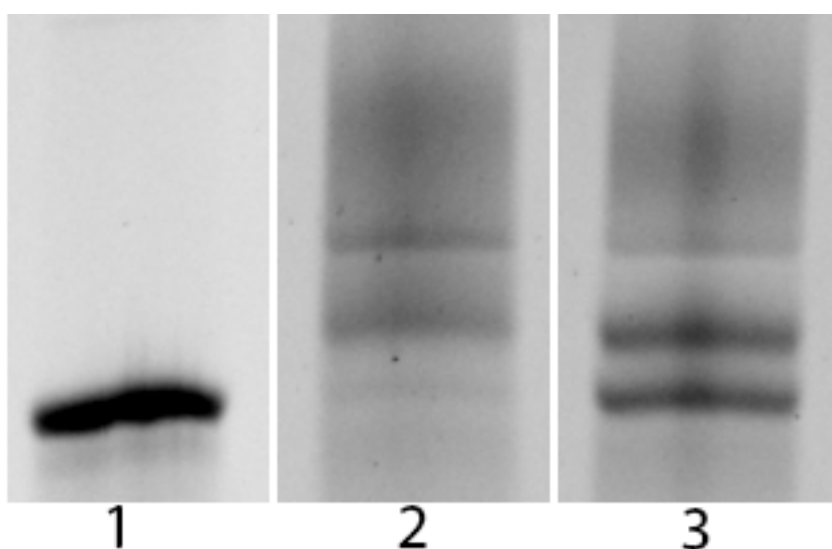


Figure S5. Hairpin polymerization of amino-modified ANNNN using cofactor **15**. Lane 1, template; Lane 2, polymerization at 25 μ M **15**; Lane 3, polymerization at 1000 μ M **15**.

Fidelity analysis

Cofactor 8

building block	codon	observed	errors
AAAAA	TTTTT	34	3
AAAAC	GTTTT	26	0
AAAAG	CTTTT	29	0
AAAAT	ATTTT	37	1
AAACA	TGTTT	58	0
AAACC	GGTTT	35	1
AAACG	CGTTT	38	1
AAACT	AGTTT	34	0
AAAGA	TCTTT	32	2
AAAGC	GCTTT	25	0
AAAGG	CCTTT	16	0
AAAGT	ACTTT	20	1
AAATA	TATTT	59	1
AAATC	GATTT	28	0
AAATG	CATTT	22	0
AAATT	AATTT	32	0
AACAA	TTGTT	120	1
AACAC	GTGTT	91	2
AACAG	CTGTT	52	1
AACAT	ATGTT	40	0
AACCA	TGGTT	74	1
AACCC	GGGTT	63	3
AACCG	CGGTT	35	1
AACCT	AGGTT	55	2
AACGA	TCGTT	41	0
AACGC	GCGTT	40	1
AACGG	CCGTT	30	0
AACGT	ACGTT	31	1
AACTA	TAGTT	65	0
AACTC	GAGTT	54	1
AACTG	CAGTT	32	2
AACTT	AAGTT	51	0
AAGAA	TTCTT	27	0
AAGAC	GTCTT	18	1
AAGAG	CTCTT	9	0
AAGAT	ATCTT	8	0
AAGCA	TGCTT	23	1

AAGCC	GGCTT	21	1
AAGCG	CGCTT	13	2
AAGCT	AGCTT	16	5
AAGGA	TCCTT	15	1
AAGGC	GCCTT	23	1
AAGGG	CCCTT	11	1
AAGGT	ACCTT	3	0
AAGTA	TACTT	12	0
AAGTC	GACTT	19	1
AAGTG	CACTT	7	0
AAGTT	AACTT	11	0
AATAA	TTATT	63	0
AATAC	GTATT	58	1
AATAG	CTATT	55	1
AATAT	ATATT	33	0
AATCA	TGATT	62	1
AATCC	GGATT	37	1
AATCG	CGATT	30	1
AATCT	AGATT	38	0
AATGA	TCATT	55	0
AATGC	GCATT	53	1
AATGG	CCATT	38	2
AATGT	ACATT	33	1
AATTA	TAATT	78	0
AATTC	GAATT	51	0
AATTG	CAATT	42	1
AATTT	AAATT	21	1
ACAAA	TTTGT	47	0
ACAAC	GTTGT	32	1
ACAAG	CTTGT	27	1
ACAAT	ATTGT	19	1
ACACA	TGTGT	32	0
ACACC	GGTGT	38	1
ACACG	CGTGT	20	0
ACACT	AGTGT	41	0
ACAGA	TCTGT	24	1
ACAGC	GCTGT	17	1
ACAGG	CCTGT	24	0
ACAGT	ACTGT	21	1
ACATA	TATGT	53	2
ACATC	GATGT	31	0
ACATG	CATGT	21	0
ACATT	AATGT	37	0

ACCAA	TTGGT	88	0
ACCAC	GTGGT	71	2
ACCAG	CTGGT	40	0
ACCAT	ATGGT	54	2
ACCCA	TGGGT	57	3
ACCCC	GGGGT	53	4
ACCCG	CGGGT	34	1
ACCCT	AGGGT	32	0
ACCGA	TCGGT	36	0
ACCGC	GCGGT	28	1
ACCGG	CCGGT	12	1
ACCGT	ACGGT	27	0
ACCTA	TAGGT	63	0
ACCTC	GAGGT	50	0
ACCTG	CAGGT	23	0
ACCTT	AAGGT	42	0
ACGAA	TTCGT	26	0
ACGAC	GTCGT	10	2
ACGAG	CTCGT	15	1
ACGAT	ATCGT	12	0
ACGCA	TGCGT	16	0
ACGCC	GGCGT	16	0
ACGCG	CGCGT	11	0
ACGCT	AGCGT	10	0
ACGGA	TCCGT	12	1
ACGGC	GCCGT	16	0
ACGGG	CCCGT	7	1
ACGGT	ACCGT	5	0
ACGTA	TACGT	10	0
ACGTC	GACGT	7	0
ACGTG	CACGT	6	0
ACGTT	AACGT	12	0
ACTAA	TTAGT	53	1
ACTAC	GTAGT	38	0
ACTAG	CTAGT	46	3
ACTAT	ATAGT	35	1
ACTCA	TGAGT	38	1
ACTCC	GGAGT	34	0
ACTCG	CGAGT	15	0
ACTCT	AGAGT	37	0
ACTGA	TCAGT	34	2
ACTGC	GCAGT	28	1
ACTGG	CCAGT	31	0

ACTGT	ACAGT	25	0
ACTTA	TAAGT	63	0
ACTTC	GAAGT	14	0
ACTTG	CAAGT	19	0
ACTTT	AAAGT	33	0
AGAAA	TTTCT	50	0
AGAAC	GTTCT	53	1
AGAAG	CTTCT	50	0
AGAAT	ATTCT	36	1
AGACA	TGTCT	56	5
AGACC	GGTCT	45	0
AGACG	CGTCT	45	1
AGACT	AGTCT	46	0
AGAGA	TCTCT	38	0
AGAGC	GCTCT	26	0
AGAGG	CCTCT	31	1
AGAGT	ACTCT	19	1
AGATA	TATCT	55	0
AGATC	GATCT	31	0
AGATG	CATCT	43	0
AGATT	AATCT	43	1
AGCAA	TTGCT	126	0
AGCAC	GTGCT	99	1
AGCAG	CTGCT	72	0
AGCAT	ATGCT	57	0
AGCCA	TGGCT	94	2
AGCCC	GGGCT	69	2
AGCCG	CGGCT	45	0
AGCCT	AGGCT	60	0
AGCGA	TCGCT	45	0
AGCGC	GCGCT	44	1
AGCGG	CCGCT	39	1
AGCGT	ACGCT	39	1
AGCTA	TAGCT	83	0
AGCTC	GAGCT	32	0
AGCTG	CAGCT	34	1
AGCTT	AAGCT	49	2
AGGAA	TTCCT	36	0
AGGAC	GTCCT	29	0
AGGAG	CTCCT	30	0
AGGAT	ATCCT	20	1
AGGCA	TGCCT	41	0
AGGCC	GGCCT	32	0

AGGCG	CGCCT	19	0
AGGCT	AGCCT	26	0
AGGGA	TCCCT	21	1
AGGGC	GCCCT	21	1
AGGGG	CCCCT	26	0
AGGGT	ACCCT	18	0
AGGTA	TACCT	26	2
AGGTC	GACCT	25	1
AGGTG	CACCT	15	0
AGGTT	AACCT	18	1
AGTAA	TTACT	71	0
AGTAC	GTACT	50	0
AGTAG	CTACT	50	2
AGTAT	ATACT	41	0
AGTCA	TGACT	55	2
AGTCC	GGACT	50	2
AGTCG	CGACT	26	0
AGTCT	AGACT	46	1
AGTGA	TCACT	35	0
AGTGC	GCACT	25	0
AGTGG	CCACT	26	0
AGTGT	ACACT	33	2
AGTTA	TAACT	75	1
AGTTC	GAACT	50	1
AGTTG	CAACT	28	1
AGTTT	AAACT	44	1
ATAAA	TTTAT	55	1
ATAAC	GTTAT	64	1
ATAAG	CTTAT	42	2
ATAAT	ATTAT	41	2
ATACA	TGTAT	82	4
ATACC	GGTAT	51	2
ATACG	CGTAT	36	1
ATACT	AGTAT	43	1
ATAGA	TCTAT	38	0
ATAGC	GCTAT	30	0
ATAGG	CCTAT	24	0
ATAGT	ACTAT	20	1
ATATA	TATAT	52	1
ATATC	GATAT	39	0
ATATG	CATAT	35	0
ATATT	AATAT	43	1
ATCAA	TTGAT	102	0

ATCAC	GTGAT	95	1
ATCAG	CTGAT	67	0
ATCAT	ATGAT	52	1
ATCCA	TGGAT	74	1
ATCCC	GGGAT	72	1
ATCCG	CGGAT	47	0
ATCCT	AGGAT	68	1
ATCGA	TCGAT	57	0
ATCGC	GCGAT	57	0
ATCGG	CCGAT	39	0
ATCGT	ACGAT	40	1
ATCTA	TAGAT	72	0
ATCTC	GAGAT	50	1
ATCTG	CAGAT	34	0
ATCTT	AAGAT	35	2
ATGAA	TTCAT	42	1
ATGAC	GTCAT	26	1
ATGAG	CTCAT	28	1
ATGAT	ATCAT	32	1
ATGCA	TGCAT	43	0
ATGCC	GGCAT	38	0
ATGCG	CGCAT	31	0
ATGCT	AGCAT	22	0
ATGGA	TCCAT	25	0
ATGGC	GCCAT	17	0
ATGGG	CCCAT	21	0
ATGGT	ACCAT	16	0
ATGTA	TACAT	36	2
ATGTC	GACAT	20	1
ATGTG	CACAT	27	0
ATGTT	AACAT	33	0
ATTAA	TTAAT	92	1
ATTAC	GTAAT	62	1
ATTAG	CTAAT	64	2
ATTAT	ATAAT	39	0
ATTCA	TGAAT	82	1
ATTCC	GGAAT	58	1
ATTCG	CGAAT	43	0
ATTCT	AGAAT	34	1
ATTGA	TCAAT	46	0
ATTGC	GCAAT	31	0
ATTGG	CCAAT	31	1
ATTGT	ACAAT	40	1

ATTTA	TAAAT	95	1
ATTTC	GAAAT	45	0
ATTTG	CAAAT	26	0
ATTTT	AAAAT	50	0

Cofactor 9

building block	codon	observed	errors
AAAAA	TTTTT	63	1
AAAAC	GTTTT	64	2
AAAAG	CTTTT	48	1
AAAAT	ATTTT	63	1
AAACA	TGTTT	54	2
AAACC	GGTTT	88	2
AAACG	CGTTT	59	2
AAACT	AGTTT	45	1
AAAGA	TCTTT	50	3
AAAGC	GCTTT	50	3
AAAGG	CCTTT	24	0
AAAGT	ACTTT	28	6
AAATA	TATTT	61	2
AAATC	GATTT	48	1
AAATG	CATTT	44	0
AAATT	AATTT	44	0
AACAA	TTGTT	99	7
AACAC	GTGTT	100	5
AACAG	CTGTT	62	1
AACAT	ATGTT	65	3
AACCA	TGGTT	92	8
AACCC	GGGTT	95	7
AACCG	CGGTT	47	1
AACCT	AGGTT	79	1
AACGA	TCGTT	65	6
AACGC	GCGTT	51	2
AACGG	CCGTT	57	0
AACGT	ACGTT	54	8
AACTA	TAGTT	70	5
AACTC	GAGTT	66	2
AACTG	CAGTT	50	0
AACTT	AAGTT	52	4
AAGAA	TTCTT	43	1
AAGAC	GTCTT	42	0
AAGAG	CTCTT	38	4
AAGAT	ATCTT	40	6
AAGCA	TGCTT	47	4
AAGCC	GGCTT	43	1
AAGCG	CGCTT	36	3
AAGCT	AGCTT	37	1

AAGGA	TCCTT	35	6
AAGGC	GCCTT	27	0
AAGGG	CCCTT	26	2
AAGGT	ACCTT	19	1
AAGTA	TACTT	35	1
AAGTC	GACTT	25	0
AAGTG	CACTT	29	1
AAGTT	AACTT	19	1
AATAA	TTATT	84	4
AATAC	GTATT	59	1
AATAG	CTATT	49	0
AATAT	ATATT	43	3
AATCA	TGATT	71	1
AATCC	GGATT	53	0
AATCG	CGATT	41	0
AATCT	AGATT	43	0
AATGA	TCATT	61	1
AATGC	GCATT	69	0
AATGG	CCATT	53	1
AATGT	ACATT	40	2
AATTA	TAATT	64	4
AATTC	GAATT	55	0
AATTG	CAATT	56	0
AATTT	AAATT	42	0
ACAAA	TTTGT	88	7
ACAAC	GTTGT	62	1
ACAAG	CTTGT	63	2
ACAAT	ATTGT	53	4
ACACA	TGTGT	95	1
ACACC	GGTGT	70	0
ACACG	CGTGT	71	0
ACACT	AGTGT	55	1
ACAGA	TCTGT	53	1
ACAGC	GCTGT	45	4
ACAGG	CCTGT	37	0
ACAGT	ACTGT	36	2
ACATA	TATGT	67	1
ACATC	GATGT	49	0
ACATG	CATGT	39	0
ACATT	AATGT	52	2
ACCAA	TTGGT	98	2
ACCAC	GTGGT	97	2
ACCAG	CTGGT	75	2

ACCAT	ATGGT	81	2
ACCCA	TGGGT	77	1
ACCCC	GGGGT	95	1
ACCCG	CGGGT	59	1
ACCCT	AGGGT	68	1
ACCGA	TCGGT	59	1
ACCGC	GCGGT	57	0
ACCGG	CCGGT	39	2
ACCGT	ACGGT	55	2
ACCTA	TAGGT	61	0
ACCTC	GAGGT	61	0
ACCTG	CAGGT	42	3
ACCTT	AAGGT	54	1
ACGAA	TTCGT	49	0
ACGAC	GTCGT	53	0
ACGAG	CTCGT	32	2
ACGAT	ATCGT	30	1
ACGCA	TGCGT	58	2
ACGCC	GGCGT	59	0
ACGCG	CGCGT	24	2
ACGCT	AGCGT	33	0
ACGGA	TCCGT	39	0
ACGGC	GCCGT	21	0
ACGGG	CCCGT	23	0
ACGGT	ACCGT	24	2
ACGTA	TACGT	35	3
ACGTC	GACGT	40	1
ACGTG	CACGT	28	0
ACGTT	AACGT	22	1
ACTAA	TTAGT	84	2
ACTAC	GTAGT	44	0
ACTAG	CTAGT	42	0
ACTAT	ATAGT	54	2
ACTCA	TGAGT	63	1
ACTCC	GGAGT	51	3
ACTCG	CGAGT	40	1
ACTCT	AGAGT	46	0
ACTGA	TCAGT	60	2
ACTGC	GCAGT	60	0
ACTGG	CCAGT	41	0
ACTGT	ACAGT	53	7
ACTTA	TAAGT	59	1
ACTTC	GAAGT	66	1

ACTTG	CAAGT	35	0
ACTTT	AAAGT	38	3
AGAAA	TTTCT	62	4
AGAAC	GTTCT	57	0
AGAAG	CTTCT	49	2
AGAAT	ATTCT	53	2
AGACA	TGTCT	58	1
AGACC	GGTCT	57	1
AGACG	CGTCT	49	3
AGACT	AGTCT	50	3
AGAGA	TCTCT	34	2
AGAGC	GCTCT	44	1
AGAGG	CCTCT	40	1
AGAGT	ACTCT	28	1
AGATA	TATCT	39	3
AGATC	GATCT	36	0
AGATG	CATCT	42	0
AGATT	AATCT	37	2
AGCAA	TTGCT	68	1
AGCAC	GTGCT	65	0
AGCAG	CTGCT	36	0
AGCAT	ATGCT	53	4
AGCCA	TGGCT	71	3
AGCCC	GGGCT	76	1
AGCCG	CGGCT	45	1
AGCCT	AGGCT	61	1
AGCGA	TCGCT	39	0
AGCGC	GCGCT	37	0
AGCGG	CCGCT	38	0
AGCGT	ACGCT	36	3
AGCTA	TAGCT	53	2
AGCTC	GAGCT	30	1
AGCTG	CAGCT	37	0
AGCTT	AAGCT	46	0
AGGAA	TTCCT	38	3
AGGAC	GTCCT	44	0
AGGAG	CTCCT	29	1
AGGAT	ATCCT	28	1
AGGCA	TGCCT	41	3
AGGCC	GGCCT	42	0
AGGCG	CGCCT	30	0
AGGCT	AGCCT	33	0
AGGGA	TCCCT	36	1

AGGGC	GCCCT	33	0
AGGGG	CCCCT	23	0
AGGGT	ACCCT	20	0
AGGTA	TACCT	31	4
AGGTC	GACCT	33	3
AGGTG	CACCT	21	1
AGGTT	AACCT	27	0
AGTAA	TTACT	64	4
AGTAC	GTACT	54	3
AGTAG	CTACT	43	1
AGTAT	ATACT	45	7
AGTCA	TGACT	48	2
AGTCC	GGACT	45	1
AGTCG	CGACT	33	1
AGTCT	AGACT	38	3
AGTGA	TCACT	40	3
AGTGC	GCACT	41	1
AGTGG	CCACT	32	0
AGTGT	ACACT	37	4
AGTTA	TAACT	39	3
AGTTC	GAACT	31	1
AGTTG	CAACT	33	0
AGTTT	AAACT	38	2
ATAAA	TTTAT	74	5
ATAAC	GTTAT	73	3
ATAAG	CTTAT	34	2
ATAAT	ATTAT	50	3
ATACA	TGTAT	88	2
ATACC	GGTAT	52	1
ATACG	CGTAT	51	1
ATACT	AGTAT	48	7
ATAGA	TCTAT	59	4
ATAGC	GCTAT	40	3
ATAGG	CCTAT	37	1
ATAGT	ACTAT	32	1
ATATA	TATAT	34	1
ATATC	GATAT	42	2
ATATG	CATAT	37	2
ATATT	AATAT	33	2
ATCAA	TTGAT	67	2
ATCAC	GTGAT	70	1
ATCAG	CTGAT	64	0
ATCAT	ATGAT	52	2

ATCCA	TGGAT	65	2
ATCCC	GGGAT	71	3
ATCCG	CGGAT	54	0
ATCCT	AGGAT	56	3
ATCGA	TCGAT	49	1
ATCGC	GCGAT	48	1
ATCGG	CCGAT	40	0
ATCGT	ACGAT	26	1
ATCTA	TAGAT	70	3
ATCTC	GAGAT	53	1
ATCTG	CAGAT	40	0
ATCTT	AAGAT	52	0
ATGAA	TTCAT	58	2
ATGAC	GTCAT	53	0
ATGAG	CTCAT	42	2
ATGAT	ATCAT	42	3
ATGCA	TGCAT	64	1
ATGCC	GGCAT	61	1
ATGCG	CGCAT	19	0
ATGCT	AGCAT	43	4
ATGGA	TCCAT	37	0
ATGGC	GCCAT	29	0
ATGGG	CCCAT	21	2
ATGGT	ACCAT	36	6
ATGTA	TACAT	46	2
ATGTC	GACAT	25	3
ATGTG	CACAT	30	1
ATGTT	AACAT	46	2
ATTAA	TTAAT	73	4
ATTAC	GTAAT	66	1
ATTAG	CTAAT	51	0
ATTAT	ATAAT	49	4
ATTCA	TGAAT	58	4
ATTCC	GGAAT	44	0
ATTCG	CGAAT	38	0
ATTCT	AGAAT	35	2
ATTGA	TCAAT	53	1
ATTGC	GCAAT	47	1
ATTGG	CCAAT	45	0
ATTGT	ACAAT	45	2
ATTTA	TAAAT	47	1
AT TTC	GAAAT	45	1
AT TTG	CAAAT	36	0

ATTTT	AAAAT	44	3
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Cofactor 12

building block	codon	observed	errors
AAAAA	TTTTT	75	0
AAAAC	GTTTT	69	2
AAAAG	CTTTT	56	2
AAAAT	ATTTT	51	3
AAACA	TGTTT	77	0
AAACC	GGTTT	85	1
AAACG	CGTTT	51	0
AAACT	AGTTT	44	1
AAAGA	TCTTT	59	0
AAAGC	GCTTT	57	0
AAAGG	CCTTT	37	0
AAAGT	ACTTT	41	5
AAATA	TATTT	67	4
AAATC	GATTT	49	1
AAATG	CATTT	43	0
AAATT	AATTT	45	2
AACAA	TTGTT	89	5
AACAC	GTGTT	99	7
AACAG	CTGTT	74	2
AACAT	ATGTT	76	5
AACCA	TGGTT	92	3
AACCC	GGGTT	78	1
AACCG	CGGTT	51	0
AACCT	AGGTT	53	3
AACGA	TCGTT	56	1
AACGC	GCGTT	52	0
AACGG	CCGTT	38	2
AACGT	ACGTT	48	5
AACTA	TAGTT	60	4
AACTC	GAGTT	66	1
AACTG	CAGTT	58	2
AACTT	AAGTT	52	3
AAGAA	TTCTT	51	2
AAGAC	GTCTT	39	2
AAGAG	CTCTT	38	2
AAGAT	ATCTT	36	6
AAGCA	TGCTT	51	2
AAGCC	GGCTT	46	1
AAGCG	CGCTT	36	0
AAGCT	AGCTT	37	4

AAGGA	TCCTT	34	0
AAGGC	GCCTT	32	2
AAGGG	CCCTT	23	0
AAGGT	ACCTT	28	2
AAGTA	TACTT	41	6
AAGTC	GACTT	43	0
AAGTG	CACTT	29	2
AAGTT	AACTT	32	3
AATAA	TTATT	83	4
AATAC	GTATT	80	8
AATAG	CTATT	58	6
AATAT	ATATT	44	5
AATCA	TGATT	76	9
AATCC	GGATT	64	4
AATCG	CGATT	52	1
AATCT	AGATT	30	4
AATGA	TCATT	57	1
AATGC	GCATT	62	2
AATGG	CCATT	38	1
AATGT	ACATT	42	2
AATTA	TAATT	67	1
AATTC	GAATT	56	2
AATTG	CAATT	50	1
AATTT	AAATT	46	3
ACAAA	TTTGT	77	0
ACAAC	GTTGT	87	1
ACAAG	CTTGT	59	3
ACAAT	ATTGT	72	4
ACACA	TGTGT	76	0
ACACC	GGTGT	81	2
ACACG	CGTGT	54	1
ACACT	AGTGT	60	2
ACAGA	TCTGT	45	2
ACAGC	GCTGT	57	2
ACAGG	CCTGT	26	0
ACAGT	ACTGT	28	1
ACATA	TATGT	66	2
ACATC	GATGT	59	2
ACATG	CATGT	50	0
ACATT	AATGT	54	3
ACCAA	TTGGT	87	2
ACCAC	GTGGT	94	0
ACCAG	CTGGT	46	0

ACCAT	ATGGT	66	4
ACCCA	TGGGT	83	1
ACCCC	GGGGT	83	1
ACCCG	CGGGT	55	0
ACCCT	AGGGT	71	1
ACCGA	TCGGT	78	2
ACCGC	GCGGT	60	3
ACCGG	CCGGT	36	0
ACCGT	ACGGT	51	0
ACCTA	TAGGT	68	4
ACCTC	GAGGT	69	1
ACCTG	CAGGT	49	1
ACCTT	AAGGT	61	1
ACGAA	TTCGT	56	1
ACGAC	GTCGT	53	2
ACGAG	CTCGT	42	2
ACGAT	ATCGT	41	1
ACGCA	TGCGT	60	1
ACGCC	GGCGT	48	0
ACGCG	CGCGT	26	1
ACGCT	AGCGT	37	1
ACGGA	TCCGT	32	1
ACGGC	GCCGT	27	1
ACGGG	CCCGT	23	1
ACGGT	ACCGT	19	1
ACGTA	TACGT	26	1
ACGTC	GACGT	40	3
ACGTG	CACGT	25	1
ACGTT	AACGT	30	1
ACTAA	TTAGT	81	2
ACTAC	GTAGT	66	1
ACTAG	CTAGT	57	1
ACTAT	ATAGT	53	3
ACTCA	TGAGT	61	2
ACTCC	GGAGT	56	3
ACTCG	CGAGT	45	1
ACTCT	AGAGT	43	3
ACTGA	TCAGT	46	3
ACTGC	GCAGT	44	2
ACTGG	CCAGT	34	0
ACTGT	ACAGT	38	2
ACTTA	TAAGT	60	1
ACTTC	GAAGT	42	1

ACTTG	CAAGT	62	0
ACTTT	AAAGT	51	2
AGAAA	TTTCT	42	2
AGAAC	GTTCT	64	2
AGAAG	CTTCT	34	0
AGAAT	ATTCT	48	4
AGACA	TGTCT	68	2
AGACC	GGTCT	63	5
AGACG	CGTCT	44	1
AGACT	AGTCT	42	3
AGAGA	TCTCT	38	4
AGAGC	GCTCT	40	2
AGAGG	CCTCT	39	0
AGAGT	ACTCT	31	2
AGATA	TATCT	44	4
AGATC	GATCT	20	1
AGATG	CATCT	36	1
AGATT	AATCT	38	3
AGCAA	TTGCT	52	2
AGCAC	GTGCT	63	2
AGCAG	CTGCT	46	3
AGCAT	ATGCT	44	4
AGCCA	TGGCT	59	3
AGCCC	GGGCT	53	0
AGCCG	CGGCT	59	1
AGCCT	AGGCT	56	2
AGCGA	TCGCT	39	1
AGCGC	GCGCT	45	1
AGCGG	CCGCT	29	0
AGCGT	ACGCT	41	2
AGCTA	TAGCT	40	3
AGCTC	GAGCT	37	1
AGCTG	CAGCT	30	1
AGCTT	AAGCT	37	4
AGGAA	TTCCT	42	2
AGGAC	GTCCT	39	0
AGGAG	CTCCT	34	1
AGGAT	ATCCT	33	2
AGGCA	TGCCT	48	3
AGGCC	GGCCT	47	2
AGGCG	CGCCT	22	0
AGGCT	AGCCT	24	3
AGGGA	TCCCT	30	0

AGGGC	GCCCT	21	0
AGGGG	CCCCT	12	0
AGGGT	ACCCT	17	0
AGGTA	TACCT	36	0
AGGTC	GACCT	25	0
AGGTG	CACCT	24	1
AGGTT	AACCT	29	2
AGTAA	TTACT	62	5
AGTAC	GTACT	53	3
AGTAG	CTACT	32	3
AGTAT	ATACT	36	4
AGTCA	TGACT	28	2
AGTCC	GGACT	45	3
AGTCG	CGACT	38	2
AGTCT	AGACT	50	5
AGTGA	TCACT	38	1
AGTGC	GCACT	38	0
AGTGG	CCACT	32	1
AGTGT	ACACT	30	1
AGTTA	TAACT	49	1
AGTTC	GAACT	33	0
AGTTG	CAACT	28	0
AGTTT	AAACT	35	4
ATAAA	TTTAT	67	3
ATAAC	GTTAT	68	2
ATAAG	CTTAT	54	2
ATAAT	ATTAT	47	7
ATACA	TGTAT	59	1
ATACC	GGTAT	77	0
ATACG	CGTAT	39	1
ATACT	AGTAT	49	2
ATAGA	TCTAT	36	0
ATAGC	GCTAT	33	1
ATAGG	CCTAT	30	2
ATAGT	ACTAT	42	4
ATATA	TATAT	52	3
ATATC	GATAT	57	5
ATATG	CATAT	57	1
ATATT	AATAT	51	6
ATCAA	TTGAT	69	3
ATCAC	GTGAT	62	1
ATCAG	CTGAT	44	0
ATCAT	ATGAT	53	1

ATCCA	TGGAT	57	2
ATCCC	GGGAT	60	4
ATCCG	CGGAT	37	1
ATCCT	AGGAT	54	3
ATCGA	TCGAT	50	1
ATCGC	GCGAT	37	0
ATCGG	CCGAT	30	0
ATCGT	ACGAT	27	2
ATCTA	TAGAT	41	2
ATCTC	GAGAT	42	1
ATCTG	CAGAT	37	0
ATCTT	AAGAT	42	1
ATGAA	TTCAT	59	3
ATGAC	GTCAT	42	1
ATGAG	CTCAT	37	1
ATGAT	ATCAT	52	2
ATGCA	TGCAT	40	2
ATGCC	GGCAT	50	0
ATGCG	CGCAT	29	0
ATGCT	AGCAT	28	1
ATGGA	TCCAT	40	1
ATGGC	GCCAT	24	0
ATGGG	CCCAT	19	0
ATGGT	ACCAT	27	4
ATGTA	TACAT	52	1
ATGTC	GACAT	33	2
ATGTG	CACAT	32	1
ATGTT	AACAT	29	1
ATTAA	TTAAT	62	0
ATTAC	GTAAT	45	0
ATTAG	CTAAT	56	0
ATTAT	ATAAT	44	0
ATTCA	TGAAT	59	2
ATTCC	GGAAT	46	2
ATTCG	CGAAT	43	1
ATTCT	AGAAT	34	3
ATTGA	TCAAT	25	1
ATTGC	GCAAT	52	0
ATTGG	CCAAT	30	0
ATTGT	ACAAT	36	2
ATTTA	TAAAT	63	3
ATTTC	GAAAT	50	2
ATTTG	CAAAT	40	0

ATTTT

AAAAT

28

1

Cofactor 16

building block	codon	observed	error
AAAAA	TTTTT	63	0
AAAAC	GTTTT	56	0
AAAAG	CTTTT	65	0
AAAAT	ATTTT	54	2
AAACA	TGTTT	101	2
AAACC	GGTTT	74	0
AAACG	CGTTT	71	0
AAACT	AGTTT	61	1
AAAGA	TCTTT	65	0
AAAGC	GCTTT	53	0
AAAGG	CCTTT	53	1
AAAGT	ACTTT	44	0
AAATA	TATTT	82	0
AAATC	GATTT	79	1
AAATG	CATTT	73	2
AAATT	AATTT	81	0
AACAA	TTGTT	180	2
AACAC	GTGTT	152	3
AACAG	CTGTT	112	1
AACAT	ATGTT	121	3
AACCA	TGGTT	171	2
AACCC	GGGTT	103	0
AACCG	CGGTT	102	0
AACCT	AGGTT	113	1
AACGA	TCGTT	134	3
AACGC	GCGTT	92	3
AACGG	CCGTT	66	2
AACGT	ACGTT	71	2
AACTA	TAGTT	141	0
AACTC	GAGTT	115	2
AACTG	CAGTT	88	1
AACTT	AAGTT	105	0
AAGAA	TTCTT	46	1
AAGAC	GTCTT	44	3
AAGAG	CTCTT	44	0
AAGAT	ATCTT	23	1
AAGCA	TGCTT	56	2
AAGCC	GGCTT	61	0
AAGCG	CGCTT	41	0
AAGCT	AGCTT	56	2

AAGGA	TCCTT	44	2
AAGGC	GCCTT	35	0
AAGGG	CCCTT	23	0
AAGGT	ACCTT	23	1
AAGTA	TACTT	56	2
AAGTC	GACTT	34	1
AAGTG	CACTT	37	0
AAGTT	AACTT	27	0
AATAA	TTATT	103	1
AATAC	GTATT	129	2
AATAG	CTATT	111	0
AATAT	ATATT	74	2
AATCA	TGATT	141	3
AATCC	GGATT	108	4
AATCG	CGATT	79	0
AATCT	AGATT	92	2
AATGA	TCATT	109	1
AATGC	GCATT	93	1
AATGG	CCATT	80	0
AATGT	ACATT	63	3
AATTA	TAATT	146	0
AATTC	GAATT	104	2
AATTG	CAATT	105	1
AATTT	AAATT	105	2
ACAAA	TTTGT	104	1
ACAAC	GTTGT	76	1
ACAAG	CTTGT	68	2
ACAAT	ATTGT	69	1
ACACA	TGTGT	104	1
ACACC	GGTGT	56	3
ACACG	CGTGT	61	0
ACACT	AGTGT	72	0
ACAGA	TCTGT	72	0
ACAGC	GCTGT	45	1
ACAGG	CCTGT	32	0
ACAGT	ACTGT	48	1
ACATA	TATGT	102	2
ACATC	GATGT	66	1
ACATG	CATGT	62	1
ACATT	AATGT	92	1
ACCAA	TTGGT	176	1
ACCAC	GTGGT	142	3
ACCAG	CTGGT	117	1

ACCAT	ATGGT	116	3
ACCCA	TGGGT	143	1
ACCCC	GGGGT	105	2
ACCCG	CGGGT	65	1
ACCCT	AGGGT	118	1
ACCGA	TCGGT	117	0
ACCGC	GCGGT	76	0
ACCGG	CCGGT	49	2
ACCGT	ACGGT	67	1
ACCTA	TAGGT	134	4
ACCTC	GAGGT	106	0
ACCTG	CAGGT	87	0
ACCTT	AAGGT	105	1
ACGAA	TTCGT	49	1
ACGAC	GTCGT	31	2
ACGAG	CTCGT	46	1
ACGAT	ATCGT	50	3
ACGCA	TGCGT	57	0
ACGCC	GGCGT	44	3
ACGCG	CGCGT	30	0
ACGCT	AGCGT	45	0
ACGGA	TCCGT	38	1
ACGGC	GCCGT	21	0
ACGGG	CCCGT	26	0
ACGGT	ACCGT	27	1
ACGTA	TACGT	39	1
ACGTC	GACGT	27	2
ACGTG	CACGT	27	1
ACGTT	AACGT	29	1
ACTAA	TTAGT	127	1
ACTAC	GTAGT	83	3
ACTAG	CTAGT	87	1
ACTAT	ATAGT	56	0
ACTCA	TGAGT	113	1
ACTCC	GGAGT	81	1
ACTCG	CGAGT	60	0
ACTCT	AGAGT	65	0
ACTGA	TCAGT	71	0
ACTGC	GCAGT	78	1
ACTGG	CCAGT	62	1
ACTGT	ACAGT	63	1
ACTTA	TAAGT	137	0
ACTTC	GAAGT	74	0

ACTTG	CAAGT	64	0
ACTTT	AAAGT	79	2
AGAAA	TTTCT	106	2
AGAAC	GTTCT	78	4
AGAAG	CTTCT	76	0
AGAAT	ATTCT	80	1
AGACA	TGTCT	104	3
AGACC	GGTCT	93	0
AGACG	CGTCT	66	0
AGACT	AGTCT	89	1
AGAGA	TCTCT	75	0
AGAGC	GCTCT	77	1
AGAGG	CCTCT	53	1
AGAGT	ACTCT	41	1
AGATA	TATCT	100	1
AGATC	GATCT	58	0
AGATG	CATCT	74	0
AGATT	AATCT	82	0
AGCAA	TTGCT	161	1
AGCAC	GTGCT	160	2
AGCAG	CTGCT	109	0
AGCAT	ATGCT	132	2
AGCCA	TGGCT	130	2
AGCCC	GGGCT	110	1
AGCCG	CGGCT	103	0
AGCCT	AGGCT	106	1
AGCGA	TCGCT	125	3
AGCGC	GCGCT	100	1
AGCGG	CCGCT	79	1
AGCGT	ACGCT	71	0
AGCTA	TAGCT	138	1
AGCTC	GAGCT	85	0
AGCTG	CAGCT	74	2
AGCTT	AAGCT	104	1
AGGAA	TTCCT	89	0
AGGAC	GTCCT	58	1
AGGAG	CTCCT	60	0
AGGAT	ATCCT	39	2
AGGCA	TGCCT	74	0
AGGCC	GGCCT	61	0
AGGCG	CGCCT	41	0
AGGCT	AGCCT	62	0
AGGGA	TCCCT	59	0

AGGGC	GCCCT	44	2
AGGGG	CCCCT	31	1
AGGGT	ACCCT	34	0
AGGTA	TACCT	65	3
AGGTC	GACCT	58	2
AGGTG	CACCT	38	0
AGGTT	AACCT	57	1
AGTAA	TTACT	118	1
AGTAC	GTACT	105	0
AGTAG	CTACT	93	2
AGTAT	ATACT	74	1
AGTCA	TGACT	120	3
AGTCC	GGACT	92	0
AGTCG	CGACT	66	1
AGTCT	AGACT	81	1
AGTGA	TCACT	106	0
AGTGC	GCACT	112	2
AGTGG	CCACT	73	0
AGTGT	ACACT	75	4
AGTTA	TAACT	147	0
AGTTC	GAACT	87	1
AGTTG	CAACT	85	0
AGTTT	AAACT	97	2
ATAAA	TTTAT	122	3
ATAAC	GTTAT	91	3
ATAAG	CTTAT	76	0
ATAAT	ATTAT	77	6
ATACA	TGTAT	142	1
ATACC	GGTAT	96	3
ATACG	CGTAT	95	1
ATACT	AGTAT	109	2
ATAGA	TCTAT	96	5
ATAGC	GCTAT	66	1
ATAGG	CCTAT	53	0
ATAGT	ACTAT	51	4
ATATA	TATAT	134	4
ATATC	GATAT	98	2
ATATG	CATAT	77	1
ATATT	AATAT	89	3
ATCAA	TTGAT	196	0
ATCAC	GTGAT	163	1
ATCAG	CTGAT	143	1
ATCAT	ATGAT	114	1

ATCCA	TGGAT	194	1
ATCCC	GGGAT	139	3
ATCCG	CGGAT	94	1
ATCCT	AGGAT	143	0
ATCGA	TCGAT	129	2
ATCGC	GCGAT	81	0
ATCGG	CCGAT	65	0
ATCGT	ACGAT	81	3
ATCTA	TAGAT	154	1
ATCTC	GAGAT	109	2
ATCTG	CAGAT	92	3
ATCTT	AAGAT	96	1
ATGAA	TTCAT	125	2
ATGAC	GTCAT	103	5
ATGAG	CTCAT	92	1
ATGAT	ATCAT	65	2
ATGCA	TGCAT	113	1
ATGCC	GGCAT	96	0
ATGCG	CGCAT	52	0
ATGCT	AGCAT	75	1
ATGGA	TCCAT	74	2
ATGGC	GCCAT	59	1
ATGGG	CCCAT	62	0
ATGGT	ACCAT	54	2
ATGTA	TACAT	111	1
ATGTC	GACAT	75	2
ATGTG	CACAT	71	1
ATGTT	AACAT	77	1
ATTAA	TTAAT	166	1
ATTAC	GTAAT	108	2
ATTAG	CTAAT	101	1
ATTAT	ATAAT	84	3
ATTCA	TGAAT	153	3
ATTCC	GGAAT	94	3
ATTCG	CGAAT	94	1
ATTCT	AGAAT	103	3
ATTGA	TCAAT	144	0
ATTGC	GCAAT	89	1
ATTGG	CCAAT	76	0
ATTGT	ACAAT	75	2
ATTTA	TAAAT	183	3
AT TTC	GAAAT	101	0
AT TTG	CAAAT	105	0

ATTTT AAAAT 106 0

Codon enrichment and bias

Cofactor 1

codon	obs poly	obs temp	freq poly	freq temp	enrichment
TTTTT	2841	1661	0.643874579	1.162204901	0.554011241
ATTTT	2235	1266	0.5065328	0.88582264	0.571821917
AATTT	1831	957	0.414971614	0.669614744	0.61971696
TATTT	2643	1363	0.599000533	0.953693726	0.628084799
ATATT	1858	939	0.421090802	0.657020109	0.640910066
ATCTT	1437	725	0.325676794	0.507283897	0.642001048
ATTAT	1900	937	0.430609539	0.655620706	0.656796735
AACTT	1178	578	0.266977914	0.404427714	0.660137535
TACTT	1572	771	0.356272734	0.539470186	0.660412278
AGATT	1211	590	0.274456922	0.412824137	0.664827701
ACCTT	937	456	0.212358494	0.319064079	0.665566913
TTATT	2708	1307	0.613731912	0.914510419	0.671104341
TTTAT	2759	1282	0.625290378	0.89701787	0.697076835
TTTCT	2020	935	0.457805931	0.654221302	0.699772279
AAATT	1643	759	0.372363933	0.531073763	0.701152946
TATAT	2161	974	0.489761692	0.681509677	0.718642315
TAATT	2218	995	0.502679978	0.696203417	0.722030322
TTCTT	2084	920	0.472310673	0.643725773	0.733714096
CACGT	929	407	0.210545401	0.284778684	0.739329917
ACCAT	831	364	0.188335014	0.254691501	0.739463285
TACAT	1480	643	0.335422167	0.449908339	0.745534453
TCTTT	2263	979	0.512878625	0.685008187	0.748718971
AGCTT	1246	539	0.282389203	0.377139339	0.748766236
TCTAT	1677	723	0.380069577	0.505884493	0.751297149
ATTCT	1594	686	0.36125874	0.479995522	0.752629396
TCGCT	1074	460	0.243407708	0.321862886	0.756246583
ACTTT	1619	690	0.366924655	0.48279433	0.760001997
ACTAT	1278	544	0.289641574	0.380637848	0.760937399
ACCCT	695	292	0.157512437	0.204312963	0.770937069
CTTTT	2330	974	0.528063277	0.681509677	0.774843403
TAAAT	1822	757	0.412931884	0.529674359	0.77959576
TTACT	1813	750	0.410892155	0.524776445	0.782985133
AAAAT	1332	551	0.301879951	0.385535762	0.783014134
CATTT	1985	820	0.44987365	0.57375558	0.784085882
AATCT	1371	558	0.310718778	0.390433675	0.795829862

AATAT	1679	679	0.380522851	0.475097608	0.800936153
GATCT	1099	441	0.249073623	0.30856855	0.807190568
CGCCT	818	328	0.185388738	0.229502232	0.807786211
ATCCT	1040	417	0.235702064	0.291775704	0.807819365
AACAT	1180	473	0.267431187	0.330959011	0.80804927
CACTT	1199	479	0.271737283	0.335157223	0.810775553
GATTT	2023	808	0.458485841	0.565359157	0.810963854
TCCAT	1210	483	0.274230285	0.337956031	0.811437763
ATACT	1375	548	0.311625324	0.383436656	0.812716571
TATCT	1694	672	0.3839224	0.470199695	0.816509249
AACCT	905	359	0.205106123	0.251192992	0.816528045
TCCCT	898	356	0.203519666	0.249093886	0.817039991
TCTCT	1389	550	0.314798237	0.38483606	0.81800608
TTCCT	1408	556	0.319104332	0.389034271	0.820247355
AGTTT	2173	858	0.492481331	0.600344253	0.820331548
TTAAT	2415	953	0.547327388	0.666815936	0.820807299
TCCTT	1435	561	0.32522352	0.392532781	0.828525759
ACCGT	859	335	0.194680839	0.234400146	0.830549139
TACCT	1072	418	0.242954435	0.292475405	0.830683299
CTCTT	1514	590	0.343127812	0.412824137	0.831171874
ATCAT	1314	512	0.297800492	0.358247387	0.831270521
GCCGT	1023	396	0.231849241	0.277081963	0.83675328
TTCAT	1973	762	0.447154011	0.533172868	0.838666101
GTTTT	2941	1133	0.666538239	0.792762283	0.840779453
TACGT	1404	540	0.318197786	0.377839041	0.842151688
AACGT	1102	422	0.249753533	0.295274213	0.84583591
TCATT	2062	789	0.467324668	0.55206482	0.846503257
TAACT	1547	589	0.350606819	0.412124435	0.850730483
TTGCT	1976	748	0.447833921	0.523377041	0.855662143
ATCGT	1417	531	0.321144062	0.371541723	0.864355311
ACACT	950	355	0.21530477	0.248394184	0.866786678
ATAAT	1682	628	0.38120276	0.43941281	0.867527645
TAGCT	1540	574	0.349020363	0.401628906	0.869012061
ACTCT	1117	416	0.253153082	0.291076002	0.869714715
TTGTT	3221	1199	0.729996487	0.83894261	0.870138765
TGATT	2167	800	0.491121511	0.559761542	0.877376302
TCCGT	1242	457	0.281482657	0.319763781	0.880283114
GCTTT	2028	742	0.459619024	0.51917883	0.88528075
CTATT	1970	720	0.446474101	0.503785387	0.886238689
TGTTT	3075	1111	0.696907544	0.777368841	0.89649534
TCAAT	1727	623	0.391401407	0.435914301	0.897886137
GTCTT	1946	700	0.441034823	0.489791349	0.900454497
TTCGT	1946	698	0.441034823	0.488391945	0.903034596

CAAAT	1347	482	0.3052795	0.337256329	0.905185384
ACATT	1565	560	0.354686278	0.391833079	0.905197384
CAATT	1732	617	0.39253459	0.431716089	0.909242441
CACCT	852	302	0.193094383	0.211309982	0.913796788
TGCTT	1900	672	0.430609539	0.470199695	0.915801401
GACAT	1218	429	0.276043378	0.300172127	0.919616959
ACGTT	1585	558	0.35921901	0.390433675	0.920051299
CCTTT	1647	579	0.373270479	0.405127416	0.921365637
ACTGT	1393	489	0.315704783	0.342154242	0.922697264
ACAAT	1230	430	0.278763017	0.300871829	0.92651751
ATTGT	2250	786	0.509932349	0.549965715	0.927207525
CGTTT	2151	751	0.487495326	0.525476147	0.927721131
AAACT	1265	440	0.286695298	0.307868848	0.931225424
TTTGT	3009	1044	0.681949528	0.730488812	0.933552324
GACTT	1324	457	0.300066858	0.319763781	0.938401645
ATAGT	1824	620	0.413385158	0.433815195	0.952906128
TCACT	1328	450	0.300973404	0.314865867	0.955878155
ATGTT	2466	834	0.558885854	0.583551407	0.957731997
TTGAT	2280	770	0.516731447	0.538770484	0.95909383
CATCT	1345	453	0.304826226	0.316964973	0.961703193
CACAT	1150	387	0.260632089	0.270784646	0.962506898
CGCAT	1211	407	0.274456922	0.284778684	0.963755145
TATGT	2450	822	0.555259669	0.575154984	0.965408776
CCTAT	1237	414	0.280349474	0.289676598	0.967801596
TCTGT	1999	669	0.453046562	0.468100589	0.967840189
CCCCT	709	237	0.160685349	0.165829357	0.968980115
TGTCT	2111	705	0.478429862	0.493289859	0.96987573
GTTAT	2533	842	0.574070507	0.589149023	0.974406279
TGCAT	1700	565	0.385282219	0.395331589	0.974579897
AGTCT	1542	511	0.349473636	0.357547685	0.977418262
TGCCT	1310	434	0.296893945	0.303670636	0.977684076
AAGCT	1321	437	0.299386948	0.305769742	0.979125488
CGATT	1500	496	0.339954899	0.347052156	0.979549885
AGCCT	1067	352	0.241821252	0.246295078	0.981835501
CTTAT	1985	654	0.44987365	0.45760506	0.983104623
AGTAT	1872	616	0.424263714	0.431016387	0.984333142
GATAT	1751	575	0.396840686	0.402328608	0.986359602
AGACT	1106	363	0.250660079	0.253991799	0.986882567
CCCTT	1088	356	0.24658062	0.249093886	0.989910368
AGCAT	1225	400	0.277629834	0.279880771	0.991957517
CGCTT	1305	425	0.295760762	0.297373319	0.994577333
GCTAT	1565	509	0.354686278	0.356148281	0.995894961
AAGAT	1399	454	0.317064603	0.317664675	0.998110989

TGTAT	2629	853	0.59582762	0.596845744	0.99829416
AGAAT	1240	401	0.281029383	0.280580473	1.001599936
TAGTT	2479	798	0.56183213	0.558362138	1.006214591
GCCTT	1352	435	0.306412683	0.304370338	1.006710064
CTCAT	1451	466	0.328849706	0.326061098	1.008552409
TTAGT	2502	801	0.567044772	0.560461244	1.011746626
TAGAT	1822	583	0.412931884	0.407926223	1.012270996
CTTCT	1585	507	0.35921901	0.354748877	1.012600838
CATAT	1816	578	0.411572065	0.404427714	1.017665335
ATGCT	1528	486	0.346300724	0.340055137	1.018366397
GAATT	1894	602	0.42924972	0.42122056	1.019061651
TCGAT	1569	498	0.355592825	0.34845156	1.020494284
AAGTT	2030	644	0.460072297	0.450608041	1.021003301
AATGT	2031	642	0.460298934	0.449208637	1.02468852
TGACT	1525	481	0.345620814	0.336556627	1.026932132
CTTGT	2234	701	0.506306163	0.490491051	1.032243427
TCGTT	2079	652	0.47117749	0.456205656	1.032818168
CGCGT	1145	359	0.259498906	0.251192992	1.03306587
ACGCT	1047	328	0.23728852	0.229502232	1.033926849
CAACT	1163	364	0.263578365	0.254691501	1.03489266
ACGAT	1163	364	0.263578365	0.254691501	1.03489266
CTCCT	1069	334	0.242274525	0.233700444	1.03668834
GAACT	1282	399	0.290548121	0.279181069	1.040715697
GTATT	2676	830	0.60647954	0.580752599	1.044299313
TAAGT	2103	652	0.476616769	0.456205656	1.044741033
CCTGT	1423	441	0.322503881	0.30856855	1.045161217
TGAAT	1879	580	0.425850171	0.405827118	1.049338874
CTCGT	1377	425	0.312078598	0.297373319	1.049450565
ACAGT	1329	410	0.301200041	0.28687779	1.049924571
CAGTT	1841	567	0.41723798	0.396730993	1.051689905
CGTCT	1397	430	0.31661133	0.300871829	1.052312977
GACGT	1288	396	0.29190794	0.277081963	1.05350755
GTTCT	1985	610	0.44987365	0.426818175	1.054017087
GCAAT	1562	480	0.354006368	0.335856925	1.054039212
GCTCT	1352	415	0.306412683	0.2903763	1.055226211
GAAAT	1497	459	0.33927499	0.321163184	1.0563944
CTGTT	2152	659	0.487721962	0.46110357	1.057727578
AGCGT	1351	413	0.306186046	0.288976896	1.059551993
GTAAT	2114	646	0.479109771	0.452007445	1.059959912
GTCGT	1686	514	0.382109307	0.35964679	1.062457158
GAGCT	1247	380	0.28261584	0.265886732	1.062918173
GCATT	1996	607	0.452366653	0.42471907	1.065096166
CCCGT	979	296	0.221877231	0.20711177	1.071292233

GACCT	1039	313	0.235475427	0.219006703	1.07519735
CCCAT	914	274	0.207145852	0.191718328	1.08046974
CCAAT	1155	346	0.261765272	0.242096867	1.081241885
CCTCT	1093	327	0.247713803	0.22880253	1.082653252
GTCAT	1798	536	0.407492606	0.375040233	1.086530378
CCGTT	1517	447	0.343807722	0.312766761	1.099246352
ATGAT	1853	546	0.419957619	0.382037252	1.099258296
CAAGT	1568	460	0.355366188	0.321862886	1.104091845
CATGT	1855	544	0.420410892	0.380637848	1.104490513
AGGTT	2077	607	0.470724217	0.42471907	1.108319006
TCAGT	1812	529	0.410665518	0.370142319	1.109480048
CTGCT	1327	387	0.300746768	0.270784646	1.110649264
CTACT	1324	386	0.300066858	0.270084944	1.111009202
CCATT	1482	432	0.335875441	0.302271232	1.111172366
TGCGT	1827	532	0.414065067	0.372241425	1.112356227
GCCAT	1264	367	0.286468662	0.256790607	1.115572976
GGCTT	1882	543	0.42653008	0.379938146	1.122630313
CTAAT	1642	473	0.372137296	0.330959011	1.124421102
AAAGT	1713	491	0.388228495	0.343553646	1.130037476
CTGAT	1676	476	0.379842941	0.333058117	1.14047045
AGGAT	1482	420	0.335875441	0.293874809	1.142920148
TTGGT	2957	835	0.670164425	0.584251109	1.147048614
GTCCT	1440	405	0.326356703	0.28337928	1.151660428
GGATT	1880	528	0.426076807	0.369442617	1.153296309
TCGGT	1994	560	0.451913379	0.391833079	1.153331364
GCTGT	1824	508	0.413385158	0.355448579	1.162995668
GGCCT	1476	410	0.334515621	0.28687779	1.166056183
ACGGT	1551	430	0.351513366	0.300871829	1.168315982
GCGAT	1454	403	0.329529616	0.281979877	1.16862813
GGTAT	2364	654	0.535768921	0.45760506	1.170810745
CTAGT	1828	505	0.414291704	0.353349473	1.172470134
TGGAT	1992	546	0.451460106	0.382037252	1.181717499
TGGTT	2916	798	0.660872324	0.558362138	1.183590863
GCGTT	2065	565	0.468004578	0.395331589	1.183827934
GGTTT	2902	794	0.657699412	0.55556333	1.183842375
GCACT	1288	351	0.29190794	0.245595376	1.188572621
CCACT	955	260	0.216437953	0.181922501	1.189726127
GCGCT	1357	367	0.307545866	0.256790607	1.197652317
CGTAT	1918	515	0.434688998	0.360346492	1.206308392
GTGAT	2179	585	0.49384115	0.409325627	1.206475035
GGA CT	1468	393	0.332702528	0.274982857	1.209902797
CGAGT	1407	374	0.318877696	0.261688521	1.218539104
GGTCT	1978	525	0.448287194	0.367343512	1.220348746

CGAAT	1312	348	0.297347219	0.243496271	1.221157178
GTGCT	1981	523	0.448967104	0.365944108	1.226873433
CCAGT	1280	337	0.290094847	0.235799549	1.230260398
GTA CT	1803	474	0.408625789	0.331658713	1.232067099
CAGCT	1297	340	0.29394767	0.237898655	1.235600384
GTTGT	2831	742	0.641608213	0.51917883	1.235813513
GAGAT	1525	399	0.345620814	0.279181069	1.237980841
CGGCT	1366	357	0.309585595	0.249793588	1.23936566
AGTGT	2252	586	0.510385622	0.410025329	1.244766081
ATGGT	2388	621	0.5412082	0.434514897	1.245545789
CGTGT	2027	524	0.459392387	0.36664381	1.252966435
AGGCT	1619	417	0.366924655	0.291775704	1.257557261
GGCAT	1708	439	0.387095312	0.307169146	1.260202456
CAGGT	1755	451	0.397747232	0.315565569	1.260426584
CAGAT	1404	359	0.318197786	0.251192992	1.266746271
CGGTT	2046	523	0.463698483	0.365944108	1.267129249
TGTGT	2902	739	0.657699412	0.517079724	1.271949723
GTGTT	3056	772	0.692601448	0.540169888	1.282191888
GTAGT	2435	614	0.55186012	0.429616983	1.284539815
TGAGT	2126	535	0.481829411	0.374340531	1.287141976
TGGCT	1989	498	0.450780196	0.34845156	1.293666749
GCA GT	1763	441	0.399560325	0.30856855	1.294883504
GATGT	2170	541	0.491801421	0.378538742	1.299210268
CGACT	1083	270	0.245447437	0.18891952	1.29921692
GAGTT	2116	527	0.479563045	0.368742916	1.300534938
GGAAT	1739	433	0.394121047	0.302970934	1.300854313
CCGGT	1486	366	0.336781987	0.256090905	1.31508765
GCGGT	2031	499	0.460298934	0.349151262	1.318336734
AAGGT	2047	500	0.463925119	0.349850963	1.326065004
TAGGT	2357	575	0.534182465	0.402328608	1.327726775
CGGAT	1425	346	0.322957154	0.242096867	1.333999728
CTGGT	2152	521	0.487721962	0.364544704	1.337893424
CCGCT	1041	252	0.2359287	0.176324886	1.338034046
AGAGT	1653	393	0.374630299	0.274982857	1.362376923
GCCCT	1028	244	0.232982424	0.17072727	1.364646808
CCGAT	1164	275	0.263805002	0.19241803	1.370999391
GGGCT	2079	490	0.47117749	0.342853944	1.374280502
GGGAT	2065	465	0.468004578	0.325361396	1.438414587
GAAGT	1844	412	0.41791789	0.288277194	1.449708469
GGGTT	2883	643	0.653393316	0.449908339	1.452280964
GGTGT	2797	617	0.633902569	0.431716089	1.468332048
GGCGT	1831	400	0.414971614	0.279880771	1.482672827
TGGGT	2948	644	0.668124695	0.450608041	1.482718094

GTGGT	3082	665	0.698494	0.465301781	1.50116339
GGAGT	1955	415	0.443074552	0.2903763	1.525863346
CGGGT	2025	422	0.458939114	0.295274213	1.55428105
GAGGT	2242	461	0.508119256	0.322562588	1.575257871
GGGGT	3151	637	0.714131925	0.445710127	1.602234011
AGGGT	2437	480	0.552313393	0.335856925	1.644490115

Cofactor 8

	obs poly	obs temp	freq poly	freq temp	fpoly/ftemp
ACCTT	3	483	0.029931158	0.337956031	0.088565244
ATCTT	8	723	0.079816422	0.505884493	0.157775981
ACCGT	5	367	0.049885264	0.256790607	0.194264364
TACTT	12	789	0.119724633	0.55206482	0.216866985
CACTT	7	450	0.069839369	0.314865867	0.221806733
GACGT	7	441	0.069839369	0.30856855	0.226333401
CTCTT	9	550	0.089793475	0.38483606	0.233329161
TACGT	10	607	0.099770528	0.42471907	0.234909461
CACGT	6	351	0.059862317	0.245595376	0.243743663
AACTT	11	623	0.109747581	0.435914301	0.251764121
GTCGT	10	508	0.099770528	0.355448579	0.280689061
TTTTT	34	1661	0.339219794	1.162204901	0.291876066
ATTGT	19	842	0.189564003	0.589149023	0.321759004
ATCGT	12	509	0.119724633	0.356148281	0.336165131
AGCGT	10	403	0.099770528	0.281979877	0.353821446
GTTTT	26	1044	0.259403372	0.730488812	0.355109302
AACGT	12	480	0.119724633	0.335856925	0.356475107
ACTTT	20	762	0.199541056	0.533172868	0.374252081
TCCTT	15	561	0.149655792	0.392532781	0.381256799
GTCTT	18	669	0.17958695	0.468100589	0.38365034
TTCTT	27	979	0.269380425	0.685008187	0.393251395
TCCGT	12	435	0.119724633	0.304370338	0.393351842
AAATT	21	757	0.209518108	0.529674359	0.395560225
CGCTT	13	460	0.129701686	0.321862886	0.40297186
TGCGT	16	565	0.159632844	0.395331589	0.403794812
CCCGT	7	244	0.069839369	0.17072727	0.409069795
CCTTT	16	556	0.159632844	0.389034271	0.410331059
ATTTT	37	1282	0.369150953	0.89701787	0.411531325
CCGGT	12	410	0.119724633	0.28687779	0.417336711
CATTT	22	750	0.219495161	0.524776445	0.418264126
CGCGT	11	367	0.109747581	0.256790607	0.4273816
CCCTT	11	356	0.109747581	0.249093886	0.440587211
CTTTT	29	935	0.289334531	0.654221302	0.442257887
GCGGT	16	499	0.159632844	0.349151262	0.457202542
AGCTT	16	498	0.159632844	0.34845156	0.45812062
GCTGT	17	514	0.169609897	0.35964679	0.471601309
AATTT	32	953	0.319265689	0.666815936	0.47879133
ATATT	33	974	0.329242742	0.681509677	0.483107948
GAAGT	14	412	0.139678739	0.288277194	0.484529272
TCTGT	24	700	0.239449267	0.489791349	0.488880147
TCTTT	32	920	0.319265689	0.643725773	0.495965367

GATTT	28	801	0.279357478	0.560461244	0.498442098
TTCGT	26	742	0.259403372	0.51917883	0.49964166
TGCTT	23	652	0.229472214	0.456205656	0.503001685
GCTTT	25	698	0.249426319	0.488391945	0.510709323
GACTT	19	529	0.189564003	0.370142319	0.51213815
CTCGT	15	415	0.149655792	0.2903763	0.515385697
GGCTT	21	560	0.209518108	0.391833079	0.534712661
CGTGT	20	523	0.199541056	0.365944108	0.545277411
ACTAT	20	512	0.199541056	0.358247387	0.556992355
ACTGT	21	536	0.209518108	0.375040233	0.558655019
CGAGT	15	380	0.149655792	0.265886732	0.562855433
GCCGT	16	396	0.159632844	0.277081963	0.576121385
ACTCT	19	466	0.189564003	0.326061098	0.581375711
TGTGT	32	772	0.319265689	0.540169888	0.59104681
TTTGT	47	1133	0.468921481	0.792762283	0.591503267
GGTTT	35	835	0.349196847	0.584251109	0.597682815
GTTGT	32	742	0.319265689	0.51917883	0.614943581
TTTAT	55	1266	0.548737903	0.88582264	0.619467011
ATTAT	41	937	0.409059164	0.655620706	0.623926548
ACCAT	16	364	0.159632844	0.254691501	0.626769419
AGTTT	34	770	0.339219794	0.538770484	0.629618371
CTTGT	27	610	0.269380425	0.426818175	0.631136255
CATGT	21	474	0.209518108	0.331658713	0.631728038
TATTT	59	1307	0.588646114	0.914510419	0.643673491
TTATT	63	1363	0.628554325	0.953693726	0.659073566
ATGTT	40	853	0.399082111	0.596845744	0.668652018
CAAGT	19	399	0.189564003	0.279181069	0.679000204
ATCCT	20	414	0.199541056	0.289676598	0.688840787
TGTTT	58	1199	0.578669061	0.83894261	0.689760007
GACAT	20	410	0.199541056	0.28687779	0.695561185
GCCTT	23	457	0.229472214	0.319763781	0.717630413
GATGT	31	614	0.309288636	0.429616983	0.719917155
GCCAT	17	335	0.169609897	0.234400146	0.723591262
CGTTT	38	748	0.379128006	0.523377041	0.724387918
ACATT	33	643	0.329242742	0.449908339	0.731799598
TTTCT	50	974	0.498852639	0.681509677	0.73198174
AACCT	18	346	0.17958695	0.242096867	0.741797911
CGATT	30	574	0.299311583	0.401628906	0.745244127
TCTAT	38	725	0.379128006	0.507283897	0.747368501
GTCAT	26	489	0.259403372	0.342154242	0.758147467
TCCAT	25	456	0.249426319	0.319064079	0.781743656
ACGTT	31	565	0.309288636	0.395331589	0.782352448
ATTCT	36	654	0.3591739	0.45760506	0.784899319

TATAT	52	939	0.518806744	0.657020109	0.78963602
GCTAT	30	531	0.299311583	0.371541723	0.805593463
GGTGT	38	665	0.379128006	0.465301781	0.814800245
AATGT	37	646	0.369150953	0.452007445	0.816692196
ATAAT	39	679	0.389105058	0.475097608	0.819000246
CCTAT	24	417	0.239449267	0.291775704	0.820662117
CACCT	15	260	0.149655792	0.181922501	0.822634863
ACAGT	25	429	0.249426319	0.300172127	0.830944306
CAGGT	23	393	0.229472214	0.274982857	0.834496434
ATCAT	32	544	0.319265689	0.380637848	0.838764958
TCCCT	21	356	0.209518108	0.249093886	0.84112104
CAAAT	26	440	0.259403372	0.307868848	0.842577526
CCTGT	24	405	0.239449267	0.28337928	0.844978032
TACCT	26	432	0.259403372	0.302271232	0.858180814
AGCAT	22	364	0.219495161	0.254691501	0.861807952
TTCAT	42	690	0.419036217	0.48279433	0.867939392
ATAGT	35	575	0.349196847	0.402328608	0.867939392
TCGTT	41	672	0.409059164	0.470199695	0.869969012
GCTCT	26	425	0.259403372	0.297373319	0.872315557
CTTAT	42	686	0.419036217	0.479995522	0.873000263
GATCT	31	505	0.309288636	0.353349473	0.875305214
GCACT	25	407	0.249426319	0.284778684	0.875860214
ACGGT	27	439	0.269380425	0.307169146	0.876977485
TTCCT	36	579	0.3591739	0.405127416	0.886570215
GATAT	39	620	0.389105058	0.433815195	0.896937367
TATGT	53	830	0.528783797	0.580752599	0.910514732
CATAT	35	548	0.349196847	0.383436656	0.910702829
TACAT	36	560	0.3591739	0.391833079	0.916650276
GGATT	37	575	0.369150953	0.402328608	0.917535928
TCTCT	38	590	0.379128006	0.412824137	0.918376548
AGATT	38	583	0.379128006	0.407926223	0.929403367
TTAGT	53	808	0.528783797	0.565359157	0.935305974
ACCCT	18	274	0.17958695	0.191718328	0.93672291
GTCCT	29	441	0.289334531	0.30856855	0.937666949
TCGGT	36	543	0.3591739	0.379938146	0.945348351
CAGTT	32	481	0.319265689	0.336556627	0.948623986
CTCAT	28	416	0.279357478	0.291076002	0.959740673
AATAT	43	628	0.429013269	0.43941281	0.976333096
AGGGT	32	465	0.319265689	0.325361396	0.981264811
CCGTT	30	434	0.299311583	0.303670636	0.985645458
CGGGT	34	490	0.339219794	0.342853944	0.989400298
GCGGT	28	400	0.279357478	0.279880771	0.9981303
AGTGT	41	585	0.409059164	0.409325627	0.999349019

GTAGT	38	541	0.379128006	0.378538742	1.001556678
CGGTT	35	498	0.349196847	0.34845156	1.002138856
GTATT	58	822	0.578669061	0.575154984	1.006109792
GCAGT	28	396	0.279357478	0.277081963	1.008212425
ATACT	41	578	0.409059164	0.404427714	1.011451861
GCCCT	21	296	0.209518108	0.207111177	1.011618548
CAATT	42	589	0.419036217	0.412124435	1.016771104
TCATT	55	771	0.548737903	0.539470186	1.017179294
AAAGT	33	459	0.329242742	0.321163184	1.025157171
CCCAT	21	292	0.209518108	0.204312963	1.025476336
TGAGT	38	527	0.379128006	0.368742916	1.028163497
TCACT	35	479	0.349196847	0.335157223	1.041889666
GCAAT	31	422	0.309288636	0.295274213	1.0474624
GGAGT	34	461	0.339219794	0.322562588	1.05164023
CTGTT	52	705	0.518806744	0.493289859	1.051727976
CGTAT	36	486	0.3591739	0.340055137	1.05622254
GACCT	25	337	0.249426319	0.235799549	1.057789636
TCAGT	34	457	0.339219794	0.319763781	1.060844958
AGAAT	34	454	0.339219794	0.317664675	1.067854947
GCGTT	40	532	0.399082111	0.372241425	1.072105586
CGCCT	19	252	0.189564003	0.176324886	1.075083657
GTTCT	53	701	0.528783797	0.490491051	1.078070225
CACAT	27	355	0.269380425	0.248394184	1.08448765
CTGGT	40	525	0.399082111	0.367343512	1.086400327
TATCT	55	720	0.548737903	0.503785387	1.089229494
CGACT	26	340	0.259403372	0.237898655	1.090394446
AACAT	33	430	0.329242742	0.300871829	1.094295678
CAACT	28	364	0.279357478	0.254691501	1.096846484
TGCAT	43	558	0.429013269	0.390433675	1.098812159
TGATT	62	798	0.618577272	0.558362138	1.107842439
GAATT	51	652	0.508829692	0.456205656	1.115351563
TAATT	78	995	0.778210117	0.696203417	1.117791291
AGTAT	43	546	0.429013269	0.382037252	1.122961876
TCAAT	46	578	0.458944428	0.404427714	1.134799649
TAGTT	65	800	0.648508431	0.559761542	1.158544099
GTTAT	64	786	0.638531378	0.549965715	1.161038517
CTATT	55	672	0.548737903	0.470199695	1.167031601
GGTAT	51	621	0.508829692	0.434514897	1.171029338
ATGGT	54	654	0.53876085	0.45760506	1.177348978
GGGGT	53	637	0.528783797	0.445710127	1.186384972
ATGAT	52	616	0.518806744	0.431016387	1.20368218
ACAAT	40	473	0.399082111	0.330959011	1.205835458
TGTCT	56	659	0.558714956	0.46110357	1.211690805

ACACT	33	387	0.329242742	0.270784646	1.215884087
GAGCT	32	374	0.319265689	0.261688521	1.220021757
CCACT	26	302	0.259403372	0.211309982	1.227596396
CCAAT	31	359	0.309288636	0.251192992	1.231278922
GGTCT	45	521	0.448967375	0.364544704	1.231583864
TTACT	71	820	0.708370747	0.57375558	1.234621103
AAGAT	35	401	0.349196847	0.280580473	1.244551497
GGCCT	32	366	0.319265689	0.256090905	1.2466889
AAGTT	51	580	0.508829692	0.405827118	1.253808998
GGCAT	38	430	0.379128006	0.300871829	1.260098054
TGGGT	57	643	0.568692008	0.449908339	1.264017488
AAAAT	50	551	0.498852639	0.385535762	1.293920534
CCATT	38	418	0.379128006	0.292475405	1.296273117
AATCT	43	473	0.429013269	0.330959011	1.296273117
AAACT	44	482	0.438990322	0.337256329	1.301651844
GAAAT	45	491	0.448967375	0.343553646	1.306833387
TGCCT	41	447	0.409059164	0.312766761	1.307872877
CTCCT	30	327	0.299311583	0.22880253	1.308165531
GTAAT	50	544	0.498852639	0.380637848	1.310570247
TGGTT	74	798	0.738301906	0.558362138	1.322263556
AGAGT	37	399	0.369150953	0.279181069	1.322263556
CCTCT	31	334	0.309288636	0.233700444	1.323440518
CAGAT	34	363	0.339219794	0.253991799	1.335554121
CGCAT	31	328	0.309288636	0.229502232	1.347649796
AGCCT	26	275	0.259403372	0.19241803	1.348124042
ACGCT	39	407	0.389105058	0.284778684	1.366341934
TTAAT	92	957	0.917888856	0.669614744	1.370771572
GTAAT	62	642	0.618577272	0.449208637	1.377037797
AGTCT	46	476	0.458944428	0.333058117	1.377971003
AAGGT	42	433	0.419036217	0.302970934	1.383090485
TGACT	55	567	0.548737903	0.396730993	1.383148564
GGGTT	63	644	0.628554325	0.450608041	1.394902594
GCATT	53	540	0.528783797	0.377839041	1.399494866
TGTAT	82	834	0.818118328	0.583551407	1.401964451
CGAAT	43	437	0.429013269	0.305769742	1.403059919
CTTCT	50	507	0.498852639	0.354748877	1.406213441
CCAGT	31	313	0.309288636	0.219006703	1.412233652
ACGAT	40	400	0.399082111	0.279880771	1.425900429
AGGTT	55	546	0.548737903	0.382037252	1.436346586
GAGTT	54	535	0.53876085	0.374340531	1.439226601
CTAGT	46	441	0.458944428	0.30856855	1.487333781
TAAGT	63	602	0.628554325	0.42122056	1.492221379
TCGAT	57	539	0.568692008	0.377139339	1.507909545

TCGCT	45	425	0.448967375	0.297373319	1.509776925
TTGTT	120	1111	1.197246333	0.777368841	1.540126476
GAACT	50	460	0.498852639	0.321862886	1.549891771
CCCCT	26	237	0.259403372	0.165829357	1.564278952
CTACT	50	453	0.498852639	0.316964973	1.573841533
ATGCT	57	515	0.568692008	0.360346492	1.578181057
CCGAT	39	352	0.389105058	0.246295078	1.579832862
TTGGT	88	794	0.877980645	0.55556333	1.580343045
GGAAT	50	451	0.498852639	0.315565569	1.580820875
CATCT	43	386	0.429013269	0.270084944	1.588438302
CGGAT	47	417	0.468921481	0.291775704	1.60712998
CTAAT	64	558	0.638531378	0.390433675	1.635441352
GTGGT	71	617	0.708370747	0.431716089	1.640825453
GGAAT	58	500	0.578669061	0.349850963	1.654044498
CGTCT	45	387	0.448967375	0.270784646	1.658023755
TTGAT	102	858	1.017659383	0.600344253	1.695126384
CCGCT	39	328	0.389105058	0.229502232	1.695430388
TAGGT	63	528	0.628554325	0.369442617	1.701358466
GAGGT	50	415	0.498852639	0.2903763	1.717952324
TAACT	75	617	0.748278958	0.431716089	1.733266324
TGGAT	74	607	0.738301906	0.42471907	1.738330012
TAGAT	72	590	0.7183478	0.412824137	1.740081879
GCGCT	44	359	0.438990322	0.251192992	1.747621696
GTGTT	91	739	0.907911803	0.517079724	1.755844913
TAAAT	95	759	0.947820014	0.531073763	1.784723857
CAGCT	34	270	0.339219794	0.18891952	1.795578318
CGGCT	45	357	0.448967375	0.249793588	1.797353482
GAGAT	50	393	0.498852639	0.274982857	1.814122683
TGAAT	82	644	0.818118328	0.450608041	1.815587503
AGACT	46	359	0.458944428	0.251192992	1.827059046
CTGAT	67	511	0.668462536	0.357547685	1.869575905
GCGAT	57	413	0.568692008	0.288976896	1.967949745
AAGCT	49	348	0.488875586	0.243496271	2.007733363
GGGAT	72	480	0.7183478	0.335856925	2.138850644
AGGAT	68	420	0.678439589	0.293874809	2.308600695
GTGAT	95	586	0.947820014	0.410025329	2.311613323
GGGCT	69	422	0.688416642	0.295274213	2.331448569
TAGCT	83	496	0.828095381	0.347052156	2.386083379
CTGCT	72	430	0.7183478	0.300871829	2.387554207
TTGCT	126	751	1.25710865	0.525476147	2.392322957
AGGCT	60	346	0.598623167	0.242096867	2.472659703
TGGCT	94	523	0.937842961	0.365944108	2.56280383
GTGCT	99	524	0.987728225	0.36664381	2.693972185

Cofactor 9

codon	obs poly	obs temp	freq poly	freq temp	fpoly/ftemp
AACTT	19	623	0.151213689	0.435914301	0.346888571
TATAT	34	939	0.270592917	0.657020109	0.411848759
ACTTT	28	762	0.222841226	0.533172868	0.417953048
TTTTT	63	1661	0.501392758	1.162204901	0.431415112
ACCTT	19	483	0.151213689	0.337956031	0.447435983
CCTTT	24	556	0.191006765	0.389034271	0.490976705
TTCTT	43	979	0.342220454	0.685008187	0.499585933
ATATT	43	974	0.342220454	0.681509677	0.502150542
TACTT	35	789	0.278551532	0.55206482	0.504563091
TGTTT	54	1199	0.429765221	0.83894261	0.512270107
AACGT	22	480	0.175089534	0.335856925	0.521321793
AATTT	44	953	0.350179069	0.666815936	0.52515102
TATTT	61	1307	0.485475527	0.914510419	0.530858389
GACTT	25	529	0.19896538	0.370142319	0.537537508
ATTTT	63	1282	0.501392758	0.89701787	0.558955149
CTTAT	34	686	0.270592917	0.479995522	0.563740503
CTTTT	48	935	0.38201353	0.654221302	0.583920959
AATAT	33	628	0.262634302	0.43941281	0.597693776
GCCGT	21	396	0.167130919	0.277081963	0.60318224
ATTAT	50	937	0.39793076	0.655620706	0.606952704
TATCT	39	720	0.310385993	0.503785387	0.616107574
TCTTT	50	920	0.39793076	0.643725773	0.618168134
ATCTT	40	723	0.318344608	0.505884493	0.629283191
AAATT	42	757	0.334261838	0.529674359	0.631070455
TCTCT	34	590	0.270592917	0.412824137	0.655467771
TACGT	35	607	0.278551532	0.42471907	0.655848894
CGCAT	19	328	0.151213689	0.229502232	0.658876768
AGTTT	45	770	0.358137684	0.538770484	0.664731448
TTTAT	74	1266	0.588937525	0.88582264	0.664848129
CATTT	44	750	0.350179069	0.524776445	0.667291895
ATCGT	30	509	0.238758456	0.356148281	0.67039059
GCCTT	27	457	0.21488261	0.319763781	0.672004221
GATTT	48	801	0.38201353	0.560461244	0.681605613
ACTCT	28	466	0.222841226	0.326061098	0.683433955
GACAT	25	410	0.19896538	0.28687779	0.693554492
GTTTT	64	1044	0.509351373	0.730488812	0.697274708
TTATT	84	1363	0.668523677	0.953693726	0.700983616
TAAAT	47	759	0.374054914	0.531073763	0.704337026
ACATT	40	643	0.318344608	0.449908339	0.707576589
TCCTT	35	561	0.278551532	0.392532781	0.709626165

ACTAT	32	512	0.254675686	0.358247387	0.710893355
GTCTT	42	669	0.334261838	0.468100589	0.714081217
ATTGT	53	842	0.421806606	0.589149023	0.715959103
TAACT	39	617	0.310385993	0.431716089	0.718958595
TTTCT	62	974	0.493434142	0.681509677	0.724031014
TAATT	64	995	0.509351373	0.696203417	0.731612859
CACTT	29	450	0.230799841	0.314865867	0.733010037
ACGAT	26	400	0.206923995	0.279880771	0.739329089
CGCGT	24	367	0.191006765	0.256790607	0.743823019
ACCGT	24	367	0.191006765	0.256790607	0.743823019
TTCCT	38	579	0.302427378	0.405127416	0.746499412
TTCGT	49	742	0.389972145	0.51917883	0.751132601
ACTGT	36	536	0.286510147	0.375040233	0.763945097
GAACT	31	460	0.246717071	0.321862886	0.766528487
CATAT	37	548	0.294468762	0.383436656	0.767972383
ATCCT	28	414	0.222841226	0.289676598	0.769275901
GATAT	42	620	0.334261838	0.433815195	0.770516668
CTCTT	38	550	0.302427378	0.38483606	0.78586029
GATCT	36	505	0.286510147	0.353349473	0.810840737
CGATT	41	574	0.326303223	0.401628906	0.812449548
GCTTT	50	698	0.39793076	0.488391945	0.814777484
TACCT	31	432	0.246717071	0.302271232	0.816210889
GTATT	59	822	0.469558297	0.575154984	0.816403074
CCCAT	21	292	0.167130919	0.204312963	0.818014271
TGCTT	47	652	0.374054914	0.456205656	0.819926078
ATAAT	49	679	0.389972145	0.475097608	0.820825317
CTATT	49	672	0.389972145	0.470199695	0.82937558
ACCCT	20	274	0.159172304	0.191718328	0.830240414
CCCTT	26	356	0.206923995	0.249093886	0.830706841
AGATT	43	583	0.342220454	0.407926223	0.838927321
AGCTT	37	498	0.294468762	0.34845156	0.845078044
GCTAT	40	531	0.318344608	0.371541723	0.856820616
TCTGT	53	700	0.421806606	0.489791349	0.861196521
ATGTT	65	853	0.517309988	0.596845744	0.866739846
TTAAT	73	957	0.58097891	0.669614744	0.867631597
GGCTT	43	560	0.342220454	0.391833079	0.873383264
AGAAT	35	454	0.278551532	0.317664675	0.87687286
CTCGT	32	415	0.254675686	0.2903763	0.87705397
ATCAT	42	544	0.334261838	0.380637848	0.878162379
TTTGT	88	1133	0.700358138	0.792762283	0.883440285
ATACT	45	578	0.358137684	0.404427714	0.885541895
AACCT	27	346	0.21488261	0.242096867	0.887589391
TTACT	64	820	0.509351373	0.57375558	0.88774975

TTGAT	67	858	0.533227218	0.600344253	0.88820242
AATCT	37	473	0.294468762	0.330959011	0.889743903
CGCTT	36	460	0.286510147	0.321862886	0.890162114
AAACT	38	482	0.302427378	0.337256329	0.896728547
CGTTT	59	748	0.469558297	0.523377041	0.897170223
TCATT	61	771	0.485475527	0.539470186	0.899911691
CACGT	28	351	0.222841226	0.245595376	0.907351062
GATGT	49	614	0.389972145	0.429616983	0.907720505
AAAAT	44	551	0.350179069	0.385535762	0.908292054
GAGCT	30	374	0.238758456	0.261688521	0.912376498
AATGT	52	646	0.41384799	0.452007445	0.915577819
TATGT	67	830	0.533227218	0.580752599	0.918165875
CACCT	21	260	0.167130919	0.181922501	0.918692951
ATTCT	53	654	0.421806606	0.45760506	0.921769977
TCCAT	37	456	0.294468762	0.319064079	0.92291418
GTTCT	57	701	0.453641066	0.490491051	0.92487124
GTAGT	44	541	0.350179069	0.378538742	0.925081186
TCTAT	59	725	0.469558297	0.507283897	0.925632175
CAAAT	36	440	0.286510147	0.307868848	0.930624028
AGCGT	33	403	0.262634302	0.281979877	0.931393775
TACAT	46	560	0.366096299	0.391833079	0.93431698
CATGT	39	474	0.310385993	0.331658713	0.935859606
AAAGT	38	459	0.302427378	0.321163184	0.941662657
TCACT	40	479	0.318344608	0.335157223	0.949836632
GTTGT	62	742	0.493434142	0.51917883	0.950412679
CTGCT	36	430	0.286510147	0.300871829	0.952266447
GGTAT	52	621	0.41384799	0.434514897	0.952436829
TTCAT	58	690	0.461599682	0.48279433	0.956100048
GAATT	55	652	0.437723836	0.456205656	0.959487963
ATGAT	52	616	0.41384799	0.431016387	0.960167648
CACAT	30	355	0.238758456	0.248394184	0.961207916
TGACT	48	567	0.38201353	0.396730993	0.962903168
GCCAT	29	335	0.230799841	0.234400146	0.984640348
CGAAT	38	437	0.302427378	0.305769742	0.989069015
TAGTT	70	800	0.557103064	0.559761542	0.995250696
GCTGT	45	514	0.358137684	0.35964679	0.995803921
CAAGT	35	399	0.278551532	0.279181069	0.997745059
AGTAT	48	546	0.38201353	0.382037252	0.999937905
CTGTT	62	705	0.493434142	0.493289859	1.000292493
GGAAT	44	500	0.350179069	0.349850963	1.000937843
TGTCT	58	659	0.461599682	0.46110357	1.001075923
ACGCT	36	407	0.286510147	0.284778684	1.00608003
CTCCT	29	327	0.230799841	0.22880253	1.008729408

CCTAT	37	417	0.294468762	0.291775704	1.009229894
TGATT	71	798	0.565061679	0.558362138	1.01199856
TTGTT	99	1111	0.787902905	0.777368841	1.013550921
TCCGT	39	435	0.310385993	0.304370338	1.01976426
AAGTT	52	580	0.41384799	0.405827118	1.01976426
TGAAT	58	644	0.461599682	0.450608041	1.024392908
TTGCT	68	751	0.541185834	0.525476147	1.029896098
CAACT	33	364	0.262634302	0.254691501	1.031185965
GACGT	40	441	0.318344608	0.30856855	1.031681966
TCGAT	49	539	0.389972145	0.377139339	1.034026698
CCTGT	37	405	0.294468762	0.28337928	1.039133002
CTAAT	51	558	0.405889375	0.390433675	1.039585981
GAAAT	45	491	0.358137684	0.343553646	1.04245054
TCAAT	53	578	0.421806606	0.404427714	1.042971565
TGCCT	41	447	0.326303223	0.312766761	1.043279733
TCGCT	39	425	0.310385993	0.297373319	1.043758714
GGATT	53	575	0.421806606	0.402328608	1.048413156
GTTAT	73	786	0.58097891	0.549965715	1.056391143
ATAGT	54	575	0.429765221	0.402328608	1.068194536
AGTGT	55	585	0.437723836	0.409325627	1.069378038
CCCGT	23	244	0.18304815	0.17072727	1.072167027
CGGTT	47	498	0.374054914	0.34845156	1.073477515
CTACT	43	453	0.342220454	0.316964973	1.07967909
CAATT	56	589	0.445682451	0.412124435	1.081426903
CCGGT	39	410	0.310385993	0.28687779	1.081945008
ACAAT	45	473	0.358137684	0.330959011	1.082120963
CTAGT	42	441	0.334261838	0.30856855	1.083266064
ACGTT	54	565	0.429765221	0.395331589	1.087100634
ACACT	37	387	0.294468762	0.270784646	1.08746477
GCGTT	51	532	0.405889375	0.372241425	1.090392815
CTTCT	49	507	0.389972145	0.354748877	1.09929071
TCGTT	65	672	0.517309988	0.470199695	1.100192096
CCCCT	23	237	0.18304815	0.165829357	1.103834407
CGACT	33	340	0.262634302	0.237898655	1.103975562
GACCT	33	337	0.262634302	0.235799549	1.113803238
TAAGT	59	602	0.469558297	0.42122056	1.114756357
ACCAT	36	364	0.286510147	0.254691501	1.124930143
GTACT	54	544	0.429765221	0.380637848	1.129065916
GTCCT	44	441	0.350179069	0.30856855	1.134850162
GGACT	45	451	0.358137684	0.315565569	1.134907351
GCACT	41	407	0.326303223	0.284778684	1.145813368
CTCAT	42	416	0.334261838	0.291076002	1.148366188
TCCCT	36	356	0.286510147	0.249093886	1.150209473

TGCGT	58	565	0.461599682	0.395331589	1.167626607
GTAAT	66	642	0.525268603	0.449208637	1.16931991
ATGCT	53	515	0.421806606	0.360346492	1.170558378
GCGCT	37	359	0.294468762	0.251192992	1.172280964
CTTGT	63	610	0.501392758	0.426818175	1.174722133
GCTCT	44	425	0.350179069	0.297373319	1.177573933
CAGTT	50	481	0.39793076	0.336556627	1.18235901
TTAGT	84	808	0.668523677	0.565359157	1.182476075
GTCGT	53	508	0.421806606	0.355448579	1.186688119
CGTAT	51	486	0.405889375	0.340055137	1.193598719
AGTCT	50	476	0.39793076	0.333058117	1.194778747
CGAGT	40	380	0.318344608	0.265886732	1.197294071
GGTGT	70	665	0.557103064	0.465301781	1.197294071
GGTTT	88	835	0.700358138	0.584251109	1.198727956
TGTAT	88	834	0.700358138	0.583551407	1.20016528
AGACT	38	359	0.302427378	0.251192992	1.203964233
CCACT	32	302	0.254675686	0.211309982	1.205223171
TAGCT	53	496	0.421806606	0.347052156	1.215398316
CAGGT	42	393	0.334261838	0.274982857	1.21557337
AACAT	46	430	0.366096299	0.300871829	1.216784905
TGGAT	65	607	0.517309988	0.42471907	1.218005089
GTCAT	53	489	0.421806606	0.342154242	1.232796656
TCGGT	59	543	0.469558297	0.379938146	1.235880896
CATCT	42	386	0.334261838	0.270084944	1.237617446
GGTCT	57	521	0.453641066	0.364544704	1.24440449
CAGAT	40	363	0.318344608	0.253991799	1.253365694
GGAGT	51	461	0.405889375	0.322562588	1.2583275
GCAAT	47	422	0.374054914	0.295274213	1.266805219
GCCCT	33	296	0.262634302	0.207111177	1.268080038
CCGAT	40	352	0.318344608	0.246295078	1.292533372
TGCAT	64	558	0.509351373	0.390433675	1.304578486
GGCCT	42	366	0.334261838	0.256090905	1.305246815
TGGTT	92	798	0.732192598	0.558362138	1.311322078
AGAGT	46	399	0.366096299	0.279181069	1.311322078
TAGGT	61	528	0.485475527	0.369442617	1.314075595
CCGCT	38	328	0.302427378	0.229502232	1.317753535
GCGAT	48	413	0.38201353	0.288976896	1.321951807
AGCAT	43	364	0.342220454	0.254691501	1.34366656
GGCGT	59	499	0.469558297	0.349151262	1.344856366
TAGAT	70	590	0.557103064	0.412824137	1.34949247
CGCCT	30	252	0.238758456	0.176324886	1.35408258
GTGAT	70	586	0.557103064	0.410025329	1.358704022
TGAGT	63	527	0.501392758	0.368742916	1.359735297

TGGGT	77	643	0.61281337	0.449908339	1.362084934
CCTCT	40	334	0.318344608	0.233700444	1.362190859
AGCCT	33	275	0.262634302	0.19241803	1.364915241
CGGGT	59	490	0.469558297	0.342853944	1.36955781
TGTGT	95	772	0.756068444	0.540169888	1.399686398
GAGTT	66	535	0.525268603	0.374340531	1.403183892
TTGGT	98	794	0.77994429	0.55556333	1.403880075
ACAGT	53	429	0.421806606	0.300172127	1.405215768
ATGGT	81	654	0.644647831	0.45760506	1.408742794
GTGCT	65	524	0.517309988	0.36664381	1.410933375
AAGGT	54	433	0.429765221	0.302970934	1.418503137
CTGAT	64	511	0.509351373	0.357547685	1.424569071
ACGGT	55	439	0.437723836	0.307169146	1.425025403
CCAAT	45	359	0.358137684	0.251192992	1.425747118
CGGCT	45	357	0.358137684	0.249793588	1.433734497
CGTCT	49	387	0.389972145	0.270784646	1.440156046
CCATT	53	418	0.421806606	0.292475405	1.442195131
GCATT	69	540	0.549144449	0.377839041	1.453381969
CGGAT	54	417	0.429765221	0.291775704	1.472930116
AAGAT	52	401	0.41384799	0.280580473	1.474970751
CCAGT	41	313	0.326303223	0.219006703	1.489923452
TCAGT	60	457	0.477516912	0.319763781	1.493342714
CCGTT	57	434	0.453641066	0.303670636	1.493858846
AAGCT	46	348	0.366096299	0.243496271	1.503498589
AGGAT	56	420	0.445682451	0.293874809	1.51657249
GAGAT	53	393	0.421806606	0.274982857	1.533937824
GTGTT	100	739	0.79586152	0.517079724	1.53914664
TGGCT	71	523	0.565061679	0.365944108	1.544120174
CGTGT	71	523	0.565061679	0.365944108	1.544120174
CAGCT	37	270	0.294468762	0.18891952	1.558699503
GGCAT	61	430	0.485475527	0.300871829	1.613562591
GCGGT	57	400	0.453641066	0.279880771	1.620836848
CTGGT	75	525	0.59689614	0.367343512	1.624899096
AGGTT	79	546	0.628730601	0.382037252	1.645731136
AGGGT	68	465	0.541185834	0.325361396	1.663337569
GAGGT	61	415	0.485475527	0.2903763	1.67188413
GGGTT	95	644	0.756068444	0.450608041	1.677884936
GGGAT	71	480	0.565061679	0.335856925	1.682447606
GGGGT	95	637	0.756068444	0.445710127	1.696323232
GCAGT	60	396	0.477516912	0.277081963	1.723377829
GTGGT	97	617	0.771985674	0.431716089	1.78817907
GAAGT	66	412	0.525268603	0.288277194	1.822095588
AGGCT	61	346	0.485475527	0.242096867	2.005294549

GGGCT	76	422	0.604854755	0.295274213	2.048450993
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Cofactor 12

codon	obs poly	obs temp	freq poly	freq temp	fpoly/ftemp
TCAAT	25	623	0.203616224	0.435914301	0.467101501
ATTTT	51	1266	0.415377097	0.88582264	0.468916777
TTTCT	42	935	0.342075257	0.654221302	0.52287392
TTTTT	75	1661	0.610848672	1.162204901	0.525594645
GATCT	20	441	0.162892979	0.30856855	0.527898839
ATATT	44	939	0.358364554	0.657020109	0.545439248
AATTT	45	957	0.366509203	0.669614744	0.547343389
TACGT	26	540	0.211760873	0.377839041	0.560452601
TATTT	67	1363	0.545691481	0.953693726	0.572187344
ATCTT	36	725	0.293207363	0.507283897	0.577994619
TCTAT	36	723	0.293207363	0.505884493	0.579593498
ATTAT	47	937	0.382798501	0.655620706	0.583871891
CCCCT	12	237	0.097735788	0.165829357	0.589375666
AAAAT	28	551	0.228050171	0.385535762	0.591514961
AGATT	30	590	0.244339469	0.412824137	0.591873021
AGTTT	44	858	0.358364554	0.600344253	0.596931765
TTTAT	67	1282	0.545691481	0.89701787	0.608339587
CATTT	43	820	0.350219906	0.57375558	0.610399128
TACTT	41	771	0.333930608	0.539470186	0.618997336
TATAT	52	974	0.423521746	0.681509677	0.621446416
AACTT	32	578	0.260628767	0.404427714	0.644438445
TTCTT	51	920	0.415377097	0.643725773	0.645270261
GTCTT	39	700	0.31764131	0.489791349	0.648523724
ACCGT	19	335	0.15474833	0.234400146	0.660188713
ACTGT	28	489	0.228050171	0.342154242	0.666512768
CTTTT	56	974	0.456100342	0.681509677	0.669249987
TGACT	28	481	0.228050171	0.336556627	0.677598219
ACCCT	17	292	0.138459032	0.204312963	0.677681096
CCTGT	26	441	0.211760873	0.30856855	0.686268491
ACTTT	41	690	0.333930608	0.48279433	0.69166224
TCTTT	59	979	0.480534289	0.685008187	0.701501527
CACTT	29	479	0.23619482	0.335157223	0.704728419
AAATT	46	759	0.374653852	0.531073763	0.705464813
TCCTT	34	561	0.276918065	0.392532781	0.705464813
GATTT	49	808	0.399087799	0.565359157	0.705901363
GTTTT	69	1133	0.561980779	0.792762283	0.708889399
AACAT	29	473	0.23619482	0.330959011	0.713667892
ACCTT	28	456	0.228050171	0.319064079	0.714747244
CACGT	25	407	0.203616224	0.284778684	0.714998121
TTATT	83	1307	0.676005864	0.914510419	0.739199741
CCTTT	37	579	0.301352012	0.405127416	0.743845023

CTCTT	38	590	0.309496661	0.412824137	0.749705826
CCCTT	23	356	0.187326926	0.249093886	0.752033417
GCTAT	33	509	0.268773416	0.356148281	0.754667172
TTAAT	62	953	0.504968236	0.666815936	0.757282795
GCCAT	24	367	0.195471575	0.256790607	0.761209989
TATCT	44	672	0.358364554	0.470199695	0.762153949
ATACT	36	548	0.293207363	0.383436656	0.764682662
CTTCT	34	507	0.276918065	0.354748877	0.780603077
CGCCT	22	328	0.179182277	0.229502232	0.78074307
TCTGT	45	669	0.366509203	0.468100589	0.782971036
TAATT	67	995	0.545691481	0.696203417	0.783810402
CGTTT	51	751	0.415377097	0.525476147	0.79047755
AATCT	38	558	0.309496661	0.390433675	0.792699709
GCCGT	27	396	0.219905522	0.277081963	0.793647914
AGCCT	24	352	0.195471575	0.246295078	0.793647914
AGCTT	37	539	0.301352012	0.377139339	0.79904688
TCTCT	38	550	0.309496661	0.38483606	0.804229886
TGTAT	59	853	0.480534289	0.596845744	0.805123089
TGTTT	77	1111	0.62713797	0.777368841	0.806744414
CCCAT	19	274	0.15474833	0.191718328	0.807165032
TTGCT	52	748	0.423521746	0.523377041	0.809209638
GTAAT	45	646	0.366509203	0.452007445	0.810847714
TAGCT	40	574	0.325785959	0.401628906	0.811161631
ATTCT	48	686	0.39094315	0.479995522	0.814472495
AGCAT	28	400	0.228050171	0.279880771	0.814811859
TCCGT	32	457	0.260628767	0.319763781	0.815066567
ATAAT	44	628	0.358364554	0.43941281	0.815553271
TAGAT	41	583	0.333930608	0.407926223	0.818605396
TGCAT	40	565	0.325785959	0.395331589	0.82408279
AACGT	30	422	0.244339469	0.295274213	0.827500195
CGCAT	29	407	0.23619482	0.284778684	0.82939782
TCATT	57	789	0.464244991	0.55206482	0.840924786
CGCGT	26	359	0.211760873	0.251192992	0.843020626
CCTAT	30	414	0.244339469	0.289676598	0.843490537
GCCTT	32	435	0.260628767	0.304370338	0.856288324
TTTGT	77	1044	0.62713797	0.730488812	0.858518242
ACGAT	27	364	0.219905522	0.254691501	0.863419159
ACCAT	27	364	0.219905522	0.254691501	0.863419159
TTGTT	89	1199	0.724873758	0.83894261	0.864032592
ACTCT	31	416	0.252484118	0.291076002	0.86741647
ACATT	42	560	0.342075257	0.391833079	0.873012706
AATAT	51	679	0.415377097	0.475097608	0.874298439
TAGTT	60	798	0.488678938	0.558362138	0.875200707

TTCCT	42	556	0.342075257	0.389034271	0.879293373
CGTAT	39	515	0.31764131	0.360346492	0.881488557
TGCTT	51	672	0.415377097	0.470199695	0.883405714
GCTTT	57	742	0.464244991	0.51917883	0.894190911
CAACT	28	364	0.228050171	0.254691501	0.895397647
GACAT	33	429	0.268773416	0.300172127	0.895397647
ACTAT	42	544	0.342075257	0.380637848	0.89868955
ATCGT	41	531	0.333930608	0.371541723	0.898770143
TTCAT	59	762	0.480534289	0.533172868	0.901272959
CCCGT	23	296	0.187326926	0.207111177	0.904472623
GTCAT	42	536	0.342075257	0.375040233	0.912102827
ATCCT	33	417	0.268773416	0.291775704	0.921164486
CTCAT	37	466	0.301352012	0.326061098	0.924219459
CACCT	24	302	0.195471575	0.211309982	0.925046576
CATCT	36	453	0.293207363	0.316964973	0.925046576
AGTAT	49	616	0.399087799	0.431016387	0.925922567
AAACT	35	440	0.285062714	0.307868848	0.925922567
GACCT	25	313	0.203616224	0.219006703	0.929725991
TTCGT	56	698	0.456100342	0.488391945	0.933881786
TATGT	66	822	0.537546832	0.575154984	0.934612142
CTATT	58	720	0.47238964	0.503785387	0.937680313
AAGTT	52	644	0.423521746	0.450608041	0.939889455
GTTAT	68	842	0.55383613	0.589149023	0.940061187
AACCT	29	359	0.23619482	0.251192992	0.940292236
TACAT	52	643	0.423521746	0.449908339	0.941351181
CAATT	50	617	0.407232448	0.431716089	0.943287634
AGTCT	42	511	0.342075257	0.357547685	0.956726253
CTTAT	54	654	0.439811044	0.45760506	0.961114905
TTACT	62	750	0.504968236	0.524776445	0.962254004
CACAT	32	387	0.260628767	0.270784646	0.962494628
GAACT	33	399	0.268773416	0.279181069	0.962720778
TCCAT	40	483	0.325785959	0.337956031	0.963989185
CTACT	32	386	0.260628767	0.270084944	0.964988138
CAAAT	40	482	0.325785959	0.337256329	0.965989163
TAACT	49	589	0.399087799	0.412124435	0.968367234
TAAAT	63	757	0.513112885	0.529674359	0.968732725
ACAAT	36	430	0.293207363	0.300871829	0.974525811
AATGT	54	642	0.439811044	0.449208637	0.97907967
CTTGT	59	701	0.480534289	0.490491051	0.979700421
TCCCT	30	356	0.244339469	0.249093886	0.980913152
TCACT	38	450	0.309496661	0.314865867	0.982947639
ACACT	30	355	0.244339469	0.248394184	0.983676288
AAGCT	37	437	0.301352012	0.305769742	0.985552101

CGCTT	36	425	0.293207363	0.297373319	0.985990821
GGCTT	46	543	0.374653852	0.379938146	0.986091699
TCGCT	39	460	0.31764131	0.321862886	0.986883928
AGAAT	34	401	0.276918065	0.280580473	0.986947032
CCGTT	38	447	0.309496661	0.312766761	0.989544603
ATAGT	53	620	0.431666395	0.433815195	0.99504674
TCGTT	56	652	0.456100342	0.456205656	0.999769152
ACGTT	48	558	0.39094315	0.390433675	1.001304895
GCCCT	21	244	0.171037628	0.17072727	1.001817859
TACCT	36	418	0.293207363	0.292475405	1.002502629
CCAAT	30	346	0.244339469	0.242096867	1.009263244
TCAGT	46	529	0.374653852	0.370142319	1.012188644
AGGTT	53	607	0.431666395	0.42471907	1.016357461
CCATT	38	432	0.309496661	0.302271232	1.023903791
CAGCT	30	340	0.244339469	0.237898655	1.027073771
CTGGT	46	521	0.374653852	0.364544704	1.027730888
AGCGT	37	413	0.301352012	0.288976896	1.042823894
TTGAT	69	770	0.561980779	0.538770484	1.043080116
ATGCT	44	486	0.358364554	0.340055137	1.053842498
ATGTT	76	834	0.618993321	0.583551407	1.060734862
ATTGT	72	786	0.586414726	0.549965715	1.06627506
GCGAT	37	403	0.301352012	0.281979877	1.068700417
CATGT	50	544	0.407232448	0.380637848	1.069868512
TAAGT	60	652	0.488678938	0.456205656	1.071181234
GCGTT	52	565	0.423521746	0.395331589	1.071307627
CTGAT	44	476	0.358364554	0.333058117	1.075982046
AAGAT	42	454	0.342075257	0.317664675	1.076843866
ACAGT	38	410	0.309496661	0.28687779	1.07884497
GAATT	56	602	0.456100342	0.42122056	1.082806457
GACTT	43	457	0.350219906	0.319763781	1.095245699
TGATT	76	800	0.618993321	0.559761542	1.105816094
GTCCT	39	405	0.31764131	0.28337928	1.120905202
GTATT	80	830	0.651571917	0.580752599	1.121944039
GCTCT	40	415	0.325785959	0.2903763	1.121944039
TGTCT	68	705	0.55383613	0.493289859	1.122739744
ATGAT	53	546	0.431666395	0.382037252	1.129906554
GAGCT	37	380	0.301352012	0.265886732	1.133384916
CGGTT	51	523	0.415377097	0.365944108	1.135083441
CCGGT	36	366	0.293207363	0.256090905	1.144934696
CATAT	57	578	0.464244991	0.404427714	1.14790598
CTCGT	42	425	0.342075257	0.297373319	1.150322624
GATAT	57	575	0.464244991	0.402328608	1.153895054
GCAGT	44	441	0.358364554	0.30856855	1.161377447

TCGAT	50	498	0.407232448	0.34845156	1.168691708
CCAGT	34	337	0.276918065	0.235799549	1.174379109
GACGT	40	396	0.325785959	0.277081963	1.175774688
TTAGT	81	801	0.659716566	0.560461244	1.177095783
ATCAT	52	512	0.423521746	0.358247387	1.182204706
TGAAT	59	580	0.480534289	0.405827118	1.184086198
CTCCT	34	334	0.276918065	0.233700444	1.184927425
GAAGT	42	412	0.342075257	0.288277194	1.186619212
GCAAT	62	607	0.504968236	0.42471907	1.188946463
CAGTT	58	567	0.47238964	0.396730993	1.19070516
CGTCT	44	430	0.358364554	0.300871829	1.191087102
AGTGT	60	586	0.488678938	0.410025329	1.191826219
TGTGT	76	739	0.618993321	0.517079724	1.197094554
CGTGT	54	524	0.439811044	0.36664381	1.199559443
CAGAT	37	359	0.301352012	0.251192992	1.199683198
GTCGT	53	514	0.431666395	0.35964679	1.200250931
AAAGT	51	491	0.415377097	0.343553646	1.209060366
TTGGT	87	835	0.70858446	0.584251109	1.21280807
TGGAT	57	546	0.464244991	0.382037252	1.215182521
CGATT	52	496	0.423521746	0.347052156	1.220340341
GTTCT	64	610	0.521257534	0.426818175	1.221263676
GAGAT	42	399	0.342075257	0.279181069	1.22528099
GTGAT	62	585	0.504968236	0.409325627	1.23365898
GGAAT	46	433	0.374653852	0.302970934	1.236599983
ATGGT	66	621	0.537546832	0.434514897	1.237119454
CGGAT	37	346	0.301352012	0.242096867	1.244758
GGTTT	85	794	0.692295162	0.55556333	1.246113854
GTAGT	66	614	0.537546832	0.429616983	1.251223422
GGGCT	53	490	0.431666395	0.342853944	1.259038732
GCACT	38	351	0.309496661	0.245595376	1.260189281
GCAAT	52	480	0.423521746	0.335856925	1.261018353
CAGGT	49	451	0.399087799	0.315565569	1.264674725
GAAAT	50	459	0.407232448	0.321163184	1.26799231
GATGT	59	541	0.480534289	0.378538742	1.269445462
CCGAT	30	275	0.244339469	0.19241803	1.269836663
AGAGT	43	393	0.350219906	0.274982857	1.273606322
TGCCT	48	434	0.39094315	0.303670636	1.287392008
GTACT	53	474	0.431666395	0.331658713	1.30153793
GCTGT	57	508	0.464244991	0.355448579	1.306082001
CTGTT	74	659	0.602704023	0.46110357	1.307090343
TGCGT	60	532	0.488678938	0.372241425	1.312801061
CTAGT	57	505	0.464244991	0.353349473	1.313840904
GGCAT	50	439	0.407232448	0.307169146	1.325759614

TGAGT	61	535	0.496823587	0.374340531	1.327196886
GGA CT	45	393	0.366509203	0.274982857	1.332843825
GGCCT	47	410	0.382798501	0.28687779	1.334360883
CCGCT	29	252	0.23619482	0.176324886	1.339543305
TGGTT	92	798	0.749307705	0.558362138	1.341974418
GTTGT	87	742	0.70858446	0.51917883	1.364817707
GGTAT	77	654	0.62713797	0.45760506	1.370478661
TAGGT	68	575	0.55383613	0.402328608	1.376576556
CTAAT	56	473	0.456100342	0.330959011	1.378117308
TGGCT	59	498	0.480534289	0.34845156	1.379056215
ACGGT	51	430	0.415377097	0.300871829	1.380578232
CTGCT	46	387	0.374653852	0.270784646	1.383586028
CCTCT	39	327	0.31764131	0.22880253	1.388277085
GGCGT	48	400	0.39094315	0.279880771	1.396820329
GGTCT	63	525	0.513112885	0.367343512	1.396820329
GCGGT	60	499	0.488678938	0.349151262	1.399619568
CGAGT	45	374	0.366509203	0.261688521	1.400555143
GTGCT	63	523	0.513112885	0.365944108	1.402161898
GGATT	64	528	0.521257534	0.369442617	1.410929625
GGGTT	78	643	0.635282619	0.449908339	1.412026771
AAGGT	61	500	0.496823587	0.349850963	1.420100668
GCGCT	45	367	0.366509203	0.256790607	1.427268729
CCACT	32	260	0.260628767	0.181922501	1.432636235
CGAAT	43	348	0.350219906	0.243496271	1.438296795
ACGCT	41	328	0.333930608	0.229502232	1.455021176
GAGTT	66	527	0.537546832	0.368742916	1.457782127
GTGTT	99	772	0.806320248	0.540169888	1.492716025
AGGAT	54	420	0.439811044	0.293874809	1.49659321
TGGGT	83	644	0.676005864	0.450608041	1.500208169
GGGAT	60	465	0.488678938	0.325361396	1.501957343
GGGGT	83	637	0.676005864	0.445710127	1.516693973
CGGGT	55	422	0.447955693	0.295274213	1.517083691
GGTGT	81	617	0.659716566	0.431716089	1.528125968
AGGCT	56	417	0.456100342	0.291775704	1.563188218
CAAGT	62	460	0.504968236	0.321862886	1.568892399
GGAGT	56	415	0.456100342	0.2903763	1.570721655
AGACT	50	363	0.407232448	0.253991799	1.60332912
TCGGT	78	560	0.635282619	0.391833079	1.62130931
CGACT	38	270	0.309496661	0.18891952	1.638246065
GTGGT	94	665	0.765597003	0.465301781	1.64537733
AGGGT	71	480	0.578270077	0.335856925	1.721775058
GAGGT	69	461	0.561980779	0.322562588	1.742237938
CGGCT	59	357	0.480534289	0.249793588	1.923725477

Cofactor 16

codon	obs poly	obs temp	freq poly	freq temp	fpoly/ftemp
ATCTT	23	723	0.104726346	0.505884493	0.207016319
TTTTT	63	1661	0.28685912	1.162204901	0.246823189
ATTTT	54	1282	0.245879246	0.89701787	0.274107411
AACTT	27	623	0.122939623	0.435914301	0.282027047
TTCTT	46	979	0.209452691	0.685008187	0.305766698
ACCTT	23	483	0.104726346	0.337956031	0.30988157
GCCGT	21	396	0.095619707	0.277081963	0.345095385
GTTTT	56	1044	0.254985885	0.730488812	0.349061999
ACTTT	44	762	0.200346052	0.533172868	0.375761904
AACGT	29	480	0.132046262	0.335856925	0.393162242
GTCGT	31	508	0.1411529	0.355448579	0.397112012
GACGT	27	441	0.122939623	0.30856855	0.398419162
TATTT	82	1307	0.373372188	0.914510419	0.408275489
TACGT	39	607	0.177579455	0.42471907	0.418110389
GACTT	34	529	0.154812859	0.370142319	0.418252252
CCCTT	23	356	0.104726346	0.249093886	0.420429209
GTCTT	44	669	0.200346052	0.468100589	0.427997864
TTCGT	49	742	0.223112649	0.51917883	0.429741423
CTTTT	65	935	0.295965759	0.654221302	0.45239395
TCTTT	65	920	0.295965759	0.643725773	0.459769939
TACTT	56	789	0.254985885	0.55206482	0.461876713
ACCGT	27	367	0.122939623	0.256790607	0.478754361
TTATT	103	1363	0.468991895	0.953693726	0.491763637
GCTTT	53	698	0.241325927	0.488391945	0.494123478
ATATT	74	974	0.336945633	0.681509677	0.494410637
GCCTT	35	457	0.159366178	0.319763781	0.498387208
CACGT	27	351	0.122939623	0.245595376	0.500577921
TCCTT	44	561	0.200346052	0.392532781	0.510393175
CCTGT	32	405	0.14570622	0.28337928	0.514173865
AGTTT	61	770	0.277752482	0.538770484	0.515530249
CTCTT	44	550	0.200346052	0.38483606	0.520601038
CGCGT	30	367	0.136599581	0.256790607	0.53194929
ATTGT	69	842	0.314179037	0.589149023	0.533276004
ATTAT	77	937	0.350605591	0.655620706	0.534768943
CACTT	37	450	0.168472817	0.314865867	0.535062178
GGTGT	56	665	0.254985885	0.465301781	0.548001093
TGTTT	101	1199	0.459885256	0.83894261	0.548172486
AATTT	81	953	0.368818869	0.666815936	0.553104461
TGCTT	56	652	0.254985885	0.456205656	0.558927495
TCCGT	38	435	0.173026136	0.304370338	0.568472398
GCTGT	45	514	0.204899372	0.35964679	0.569723899

ACTCT	41	466	0.186686094	0.326061098	0.572549425
GGCGT	44	499	0.200346052	0.349151262	0.573808759
GGTTT	74	835	0.336945633	0.584251109	0.576713725
CGCTT	41	460	0.186686094	0.321862886	0.580017461
ACTGT	48	536	0.21855933	0.375040233	0.582762356
TTTGT	104	1133	0.473545214	0.792762283	0.597335701
ATCCT	39	414	0.177579455	0.289676598	0.613026585
CGTTT	71	748	0.323285675	0.523377041	0.61769174
CCTTT	53	556	0.241325927	0.389034271	0.620320482
TTTAT	122	1266	0.555504963	0.88582264	0.627106306
CATTT	73	750	0.332392314	0.524776445	0.63339793
ATAGT	56	575	0.254985885	0.402328608	0.633775177
ACATT	63	643	0.28685912	0.449908339	0.637594584
ATCGT	50	509	0.227665968	0.356148281	0.63924489
GATTT	79	801	0.35971223	0.560461244	0.641814638
ACTAT	51	512	0.232219288	0.358247387	0.6482093
TGCGT	57	565	0.259539204	0.395331589	0.656510159
GTTGT	76	742	0.346052272	0.51917883	0.666537717
TCTGT	72	700	0.327838995	0.489791349	0.669344192
CCCGT	26	244	0.118386304	0.17072727	0.693423514
GATGT	66	614	0.300519078	0.429616983	0.699504652
TTTCT	106	974	0.482651853	0.681509677	0.708209831
GGCTT	61	560	0.277752482	0.391833079	0.708854092
CTTAT	76	686	0.346052272	0.479995522	0.72094896
CTCGT	46	415	0.209452691	0.2903763	0.721314691
GTTCT	78	701	0.355158911	0.490491051	0.724088462
CTTGT	68	610	0.309625717	0.426818175	0.725427676
AGCGT	45	403	0.204899372	0.281979877	0.72664537
AGCTT	56	498	0.254985885	0.34845156	0.731768528
GATCT	58	505	0.264092523	0.353349473	0.74739753
GTTAT	91	786	0.414352063	0.549965715	0.753414352
CGTGT	61	523	0.277752482	0.365944108	0.75900247
ATCAT	65	544	0.295965759	0.380637848	0.777552102
CCGGT	49	410	0.223112649	0.28687779	0.777727161
ATTCT	80	654	0.36426555	0.45760506	0.796026052
TATGT	102	830	0.464438576	0.580752599	0.799718462
AGTGT	72	585	0.327838995	0.409325627	0.800924674
ATAAT	84	679	0.382478827	0.475097608	0.805053152
ACCCT	34	274	0.154812859	0.191718328	0.80750161
GCTAT	66	531	0.300519078	0.371541723	0.808843421
ACGTT	71	565	0.323285675	0.395331589	0.817758268
CCTAT	53	417	0.241325927	0.291775704	0.827093975
TCTCT	75	590	0.341498953	0.412824137	0.827226226

ATACT	74	578	0.336945633	0.404427714	0.8331418
CCCCT	31	237	0.1411529	0.165829357	0.851193681
CATGT	62	474	0.282305801	0.331658713	0.851193681
GTCCT	58	441	0.264092523	0.30856855	0.855863385
TCTAT	96	725	0.43711866	0.507283897	0.861684477
CGGGT	65	490	0.295965759	0.342853944	0.863241517
TGTGT	104	772	0.473545214	0.540169888	0.876659779
CGATT	79	574	0.35971223	0.401628906	0.895633319
AAATT	105	757	0.478098534	0.529674359	0.902627295
TATCT	100	720	0.455331937	0.503785387	0.903821247
CATAT	77	548	0.350605591	0.383436656	0.914376823
TCATT	109	771	0.496311811	0.539470186	0.919998592
AATAT	89	628	0.405245424	0.43941281	0.922243081
ATGTT	121	853	0.550951644	0.596845744	0.923105592
AATGT	92	646	0.418905382	0.452007445	0.926766554
TATAT	134	939	0.610144796	0.657020109	0.928654674
TTACT	118	820	0.537291686	0.57375558	0.936446989
CACCT	38	260	0.173026136	0.181922501	0.95109805
TAATT	146	995	0.664784628	0.696203417	0.954871251
ACAGT	63	429	0.28685912	0.300172127	0.955648759
ACCAT	54	364	0.245879246	0.254691501	0.965400277
GCCCT	44	296	0.200346052	0.20711177	0.96733301
CTTCT	76	507	0.346052272	0.354748877	0.97548518
TACCT	65	432	0.295965759	0.302271232	0.979139684
CCGTT	66	434	0.300519078	0.303670636	0.989621789
ACGGT	67	439	0.305072398	0.307169146	0.993173962
GTAGT	83	541	0.377925508	0.378538742	0.998379995
TTCCT	89	579	0.405245424	0.405127416	1.000291287
GGTAT	96	621	0.43711866	0.434514897	1.005992344
TCAGT	71	457	0.323285675	0.319763781	1.011014051
GTATT	129	822	0.587378199	0.575154984	1.021252037
TTAGT	127	808	0.57827156	0.565359157	1.022839292
AGATT	92	583	0.418905382	0.407926223	1.026914569
TGTCT	104	659	0.473545214	0.46110357	1.026982321
CGAGT	60	380	0.273199162	0.265886732	1.027502049
GATAT	98	620	0.446225298	0.433815195	1.02860689
CGCAT	52	328	0.236772607	0.229502232	1.031678887
ACAAT	75	473	0.341498953	0.330959011	1.031846667
CCTCT	53	334	0.241325927	0.233700444	1.032629305
CTGTT	112	705	0.509971769	0.493289859	1.033817664
GAATT	104	652	0.473545214	0.456205656	1.038008205
GGGTT	103	644	0.468991895	0.450608041	1.040797883
CAAGT	64	399	0.29141244	0.279181069	1.043811605

TTGTT	180	1111	0.819597487	0.777368841	1.054322535
TCCAT	74	456	0.336945633	0.319064079	1.056043773
CGCCT	41	252	0.186686094	0.176324886	1.058762032
AGAGT	65	399	0.295965759	0.279181069	1.060121162
AACCT	57	346	0.259539204	0.242096867	1.072046936
GGGGT	105	637	0.478098534	0.445710127	1.072666974
CTATT	111	672	0.50541845	0.470199695	1.074901697
TGCCT	74	447	0.336945633	0.312766761	1.077306399
TCCCT	59	356	0.268645843	0.249093886	1.078492319
GGCCT	61	366	0.277752482	0.256090905	1.084585496
GTAAT	108	642	0.491758492	0.449208637	1.094721809
TGTAT	142	834	0.646571351	0.583551407	1.107993816
CGTCT	66	387	0.300519078	0.270784646	1.109808415
GACCT	58	337	0.264092523	0.235799549	1.119987397
AAAGT	79	459	0.35971223	0.321163184	1.120029467
GCATT	93	540	0.423458701	0.377839041	1.120738346
GCGTT	92	532	0.418905382	0.372241425	1.125359387
AATCT	82	473	0.373372188	0.330959011	1.128152355
TTAAT	166	957	0.755851015	0.669614744	1.128784905
ACGCT	71	407	0.323285675	0.284778684	1.135217252
GGAGT	81	461	0.368818869	0.322562588	1.143402497
GCCAT	59	335	0.268645843	0.234400146	1.1460993
TAGTT	141	800	0.642018031	0.559761542	1.146949162
TGATT	141	798	0.642018031	0.558362138	1.149823721
ATGGT	116	654	0.528185047	0.45760506	1.154237776
CAATT	105	589	0.478098534	0.412124435	1.160082959
GGTCT	93	521	0.423458701	0.364544704	1.161609802
AACAT	77	430	0.350605591	0.300871829	1.165298835
GAAGT	74	412	0.336945633	0.288277194	1.168825146
CTAAT	101	558	0.459885256	0.390433675	1.177883173
AAGTT	105	580	0.478098534	0.405827118	1.178084246
TTCAT	125	690	0.569164921	0.48279433	1.178897278
GCTCT	77	425	0.350605591	0.297373319	1.179008233
GACAT	75	410	0.341498953	0.28687779	1.190398715
CAGTT	88	481	0.400692105	0.336556627	1.190563705
CTCCT	60	327	0.273199162	0.22880253	1.194039078
CCGAT	65	352	0.295965759	0.246295078	1.20167143
ATGAT	114	616	0.519078408	0.431016387	1.204312467
AGTCT	89	476	0.405245424	0.333058117	1.216740872
GGATT	108	575	0.491758492	0.402328608	1.222280698
GGAAT	94	500	0.428012021	0.349850963	1.22341244
GAACT	87	460	0.396138785	0.321862886	1.230768759
GCGGT	76	400	0.346052272	0.279880771	1.236427466

CCATT	80	418	0.36426555	0.292475405	1.245457029
CATCT	74	386	0.336945633	0.270084944	1.247554301
AAAAT	106	551	0.482651853	0.385535762	1.251899048
GTA CT	105	544	0.478098534	0.380637848	1.256045703
AACT	75	387	0.341498953	0.270784646	1.261145926
CGACT	66	340	0.300519078	0.237898655	1.263223107
CGTAT	95	486	0.43256534	0.340055137	1.272044718
GCGAT	81	413	0.368818869	0.288976896	1.276291891
GCA GT	78	396	0.355158911	0.277081963	1.281782859
CTAGT	87	441	0.396138785	0.30856855	1.283795077
CCAGT	62	313	0.282305801	0.219006703	1.28902813
TACAT	111	560	0.50541845	0.391833079	1.289882037
TCGTT	134	672	0.610144796	0.470199695	1.297629076
AGTAT	109	546	0.496311811	0.382037252	1.299118891
CACAT	71	355	0.323285675	0.248394184	1.301502595
AAACT	97	482	0.441671979	0.337256329	1.309603234
ACGAT	81	400	0.368818869	0.279880771	1.317771378
TGCAT	113	558	0.514525089	0.390433675	1.317829689
GGACT	92	451	0.418905382	0.315565569	1.327474931
CGGTT	102	498	0.464438576	0.34845156	1.332864104
CTACT	93	453	0.423458701	0.316964973	1.335979485
GTGTT	152	739	0.692104544	0.517079724	1.338487108
GAAAT	101	491	0.459885256	0.343553646	1.338612649
AGCAT	75	364	0.341498953	0.254691501	1.340833718
AGGTT	113	546	0.514525089	0.382037252	1.346792979
GTCAT	103	489	0.468991895	0.342154242	1.370703142
GCAAT	89	422	0.405245424	0.295274213	1.372437571
TGACT	120	567	0.546398324	0.396730993	1.377251424
CCAAT	76	359	0.346052272	0.251192992	1.377635059
CCCAT	62	292	0.282305801	0.204312963	1.381732207
TGGTT	171	798	0.778617612	0.558362138	1.394467066
TTGCT	161	751	0.733084419	0.525476147	1.395086004
TGAGT	113	527	0.514525089	0.368742916	1.395349082
GAGTT	115	535	0.523631728	0.374340531	1.398811201
CGAAT	94	437	0.428012021	0.305769742	1.3997854
TCGGT	117	543	0.532738366	0.379938146	1.402171304
CTCAT	92	416	0.418905382	0.291076002	1.439161524
TCACT	106	479	0.482651853	0.335157223	1.440075941
CAGGT	87	393	0.396138785	0.274982857	1.440594476
TTGGT	176	794	0.801384209	0.55556333	1.44247139
TGGGT	143	643	0.65112467	0.449908339	1.4472385
CTGGT	117	525	0.532738366	0.367343512	1.450245749
GGCAT	96	430	0.43711866	0.300871829	1.452840106

CGGAT	94	417	0.428012021	0.291775704	1.46692139
AGCCT	62	275	0.282305801	0.19241803	1.46714838
AGACT	81	359	0.368818869	0.251192992	1.468268945
AGAAT	103	454	0.468991895	0.317664675	1.476374089
GAGCT	85	374	0.387032146	0.261688521	1.478980222
TAAGT	137	602	0.623804754	0.42122056	1.480945644
TTGAT	196	858	0.892450596	0.600344253	1.486564736
GTGGT	142	617	0.646571351	0.431716089	1.497677217
CAACT	85	364	0.387032146	0.254691501	1.519611547
TGAAT	153	644	0.696657864	0.450608041	1.546039574
TAACT	147	617	0.669337947	0.431716089	1.55041233
CAAAT	105	440	0.478098534	0.307868848	1.552929233
TCGAT	129	539	0.587378199	0.377139339	1.557456724
AAGAT	96	401	0.43711866	0.280580473	1.557908344
CCGCT	79	328	0.35971223	0.229502232	1.567358308
TAAAT	183	759	0.833257445	0.531073763	1.569005105
CCACT	73	302	0.332392314	0.211309982	1.573008104
AAGGT	105	433	0.478098534	0.302970934	1.578034325
TGGCT	130	523	0.591931518	0.365944108	1.617546247
TCAAT	144	578	0.655677989	0.404427714	1.621248908
CAGAT	92	363	0.418905382	0.253991799	1.649287035
CTGCT	109	430	0.496311811	0.300871829	1.649578871
AGGGT	118	465	0.537291686	0.325361396	1.651368884
TAGGT	134	528	0.610144796	0.369442617	1.651527915
GAGGT	106	415	0.482651853	0.2903763	1.662159941
ATGCT	132	515	0.601038157	0.360346492	1.667945074
GGGCT	110	422	0.500865131	0.295274213	1.696271155
TAGAT	154	590	0.701211183	0.412824137	1.698571184
CAGCT	74	270	0.336945633	0.18891952	1.783540594
GCACT	112	407	0.509971769	0.284778684	1.790765242
GAGAT	109	393	0.496311811	0.274982857	1.804882734
GTGAT	163	586	0.742191057	0.410025329	1.810110265
TAGCT	138	496	0.628358073	0.347052156	1.810558046
GCGCT	100	359	0.455331937	0.251192992	1.812677709
CTGAT	143	511	0.65112467	0.357547685	1.821084845
CGGCT	103	357	0.468991895	0.249793588	1.87751775
GGGAT	139	480	0.632911392	0.335856925	1.8844673
TCGCT	125	425	0.569164921	0.297373319	1.913974405
AAGCT	104	348	0.473545214	0.243496271	1.944773993
GTGCT	160	524	0.728531099	0.36664381	1.987026863
AGGCT	106	346	0.482651853	0.242096867	1.993631143
TGGAT	194	607	0.883343958	0.42471907	2.079831166
AGGAT	143	420	0.65112467	0.293874809	2.215653228